

# Audio

Annual Index

THE AUTHORITATIVE MAGAZINE ABOUT HIGH FIDELITY • DECEMBER 1978

\$1.25

47425 

Interview with Les Paul

Christmas  
Buying Guide



00803780 0280 70620015P0101B11  
CON L H INTER  
2600 CENTRAL BLVD  
EUGENE, OR 97403

12



7189647425

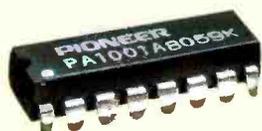
# THE RIGHT WAY.



when combined with lower audible frequencies.

Most of our competitors use a standard high band filter to cancel out this signal. Unfortunately, it also cancels out some of the music.

Pioneer created a special integrated circuit that eliminates this pilot signal without affecting the music.



*A pilot signal canceling circuit that lets you hear only music and nothing more.*

Which means that you're assured of hearing everything the musicians had intended you to hear. Nothing more. And nothing less.

Obviously, the SX-780 is the

only receiver that gives you this feature in this price range. The others give you the noise.



*An accurate picture of what you're listening to.*

## WATTAGE METERS THAT LET YOU SEE WHAT YOU'RE HEARING.

When a receiver has wattage meters, it lets

you see exactly how much power is going through your speakers. So that it not only helps prevent unnecessary damage due to overloading, it helps you make cleaner FM recordings.

Of course, the SX-780 has other virtues conspicuously absent from our competitors' models. Like a built-in wood grain cabinet. Which is something others give you the option of paying extra for.

But what really separates Pioneer's SX-780 from others is more than just a matter of wood cabinets, wattage meters, metal bottoms, DC power, or even price.

It's our commitment to giving you a quality hi-fi receiver, no matter how much, or how little, you plan to spend.

So if you're planning to spend less than \$400, you couldn't ask for more than the SX-780.

**PIONEER®**  
We bring it back alive.

POWER: 45 watts per channel min. at 8 ohms from 20-20,000 hertz with no more than .05% total harmonic distortion.  
FM SENSITIVITY: Stereo: 37.0 dBf

S/N RATIO: Stereo: 72 dBf  
CAPTURE RATIO: 1.0 dBf  
POWER METERS: 2  
SPEAKERS: A, B, AB  
TONE CONTROLS: Dual  
TAPE MONITORS: 2

# PIONEER DID IT

## INTRODUCING THE SX-780.

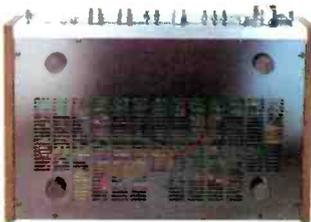
It seems that our competitors think they've mastered the art of building a moderately priced receiver.

Unfortunately, most of them appear to be the work of cost reduction engineers, rather than high fidelity engineers. People whose jobs depend on the cost of what goes into a receiver, not the sound that comes out of it.

At Pioneer, on the other hand, we build a receiver that sells for under \$400 with the same care given to a receiver that sells for over \$1000.

A perfect example is the SX-780.

It offers the kind of features, value and sound you won't find in any other comparably priced receiver.



*Metal shields our SX-780 from spurious noise.*

metal. It's designed to shield the tuning section from spurious noise and keep CB interference from getting in the way of your music.

Equally important is the fact that our bottom has a special ventilating system that allows air to circulate freely around the heat sinks. This not only reduces FM drift due to overheated tuning elements, but increases the life expectancy of the circuitry.

### A DC AMPLIFIER WITH THE POWER TO ELIMINATE DISTORTION.

The SX-780 features the same DC power configuration found in today's most expensive receivers.



*DC power supply found on the most expensive receivers.*

### A STRONG CASE FOR THE METAL BOTTOM.

If you turn over our SX-780, for instance, you'll notice the bottom is made of heavy gauge

It provides cleaner sound and richer, more natural bass because it eliminates feedback and something called TIM (transient intermodulation). Transient intermodulation is a form of distortion that can keep you from hearing the subtle overtones in your music.

Which interestingly enough is why receivers with a conventional power amplifier might possibly be able to match the specs of the SX-780, but never the sound.

### A PILOT SIGNAL CANCELING SYSTEM THAT'S UNHEARD OF IN THIS PRICE RANGE.

All stereo FM stations in America broadcast their music over a pilot signal of 19,000 hertz.

If not eliminated, this signal tends to create an extremely high pitched sound

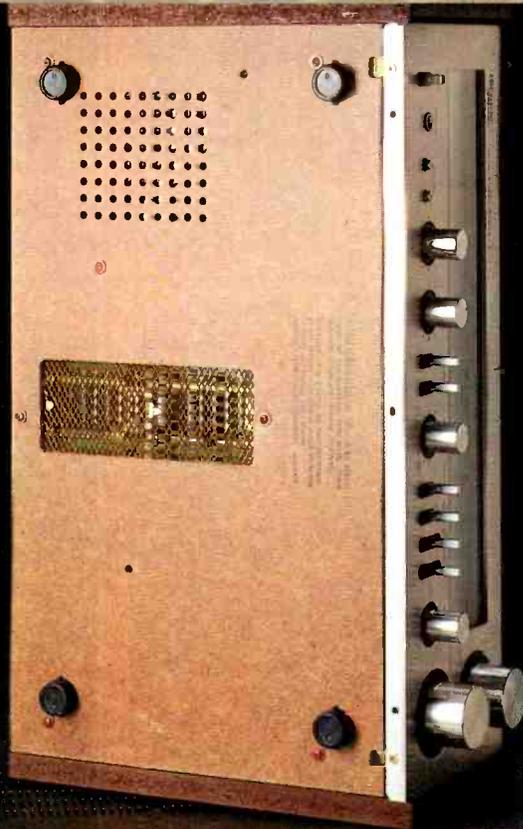


**THERE ARE A LOT  
OF WAYS TO BUILD  
A RECEIVER THAT SELLS  
FOR UNDER \$400.**

YOU CAN  
LEAVE OUT  
DUAL WATTAGE  
METERS LIKE  
MARANTZ DID.



YOU CAN INSTALL  
AN INEXPENSIVE  
PRESS BOARD BOTTOM  
LIKE TECHNICS DID.  
INSTEAD OF  
A METAL ONE.



YOU CAN USE  
A CONVENTIONAL POWER  
AMPLIFIER LIKE  
KENWOOD DID.  
INSTEAD OF  
AN ADVANCED  
DC AMPLIFIER.



YOU  
CAN USE  
STANDARD  
HIGH BAND  
FILTERS LIKE  
YAMAHA DID.  
INSTEAD OF SPECIAL  
INTEGRATED CIRCUITS TO CANCEL  
THE UNWANTED FM PILOT SIGNAL

**Editor**  
Eugene Pitts III

**Associate Editors:**  
Edward Tatnall Canby, Bert Whyte

**Assistant Editor**  
Eugene J. Garvin, Jr.

**Design**  
Frank Moore

**Production Manager**  
Katharine H. Sumner  
**Assistant Production Manager**  
Margaret S. Stinely

**Senior Editors:**  
Richard C. Heyser, B. V. Pisha

**Contributing Editors:**  
Tom Bingham, Herman Burstein,  
Geoffrey T. Cook, John Diliberto,  
Leonard Feldman, Joseph Giovanelli,  
C.G. McProud, George Pontis,  
Howard A. Roberson, Jon Sank,  
Donald M. Spoto, Michael Tearson,  
Jon Tiven

**Vice President/Publisher**  
Jay L. Butler



**AUDIO** is published monthly by  
North American Publishing Company.  
Irvin J. Borowsky, Founder and President

Frank L. Nemeyer, Vice President/General Manager  
Harry Feld, Treasurer

Joseph Florentine, Chief Financial Officer  
R. Kenneth Baxter, Vice President/Manufacturing  
Stan Karol, Production Director

Vic Brody, Promotion Director  
Jim Atkins, Subscription Promotion Director

Mary Claffey, Vice President/Circulation  
S.O. (Shap) Shapiro, Circulation Consultant

Jean Davis, Subscription Manager

#### ADVERTISING SALES

Jay Butler, Vice President/Publisher,  
545 Madison Ave., New York, NY 10022  
Telephone (212) 371-4100

**West Coast Sales Office:** Jay Martin, 17000 Ventura  
Blvd., Encino, CA 91316 Telephone (213) 788-9900.

**Continental European Representative:** V.B. Sanders,  
International Publishers Advertising Service,  
Raadhuisstraat 24, P.O. Box 25, Gratt-De Ryp,  
Holland Telephone, 02997-1303.

**England:** The Paul Singer-Lawrence Media Group,  
54 Burton Court, London SW3 5Y4, England.  
Phone: 01-730-3592

Title registered in U. S. Patent Office.  
Entire contents copyrighted world wide. No portion  
may be reproduced in any language without written  
permission.

**World Library Congress Number** ISSN 0004-752X  
**Dewey Decimal Number** 621.381 or 778.5

**Editorial Contributions** are welcomed but should be  
accompanied by return postage. Submissions will be  
handled with reasonable care, but the publisher  
assumes no responsibility for return or safety of  
manuscripts, photographs, or artwork.  
Printed in U.S.A. at Columbus, Ohio. Second-class  
postage paid at Philadelphia, PA and additional mail-  
ing offices. **USPS Number 036-960**

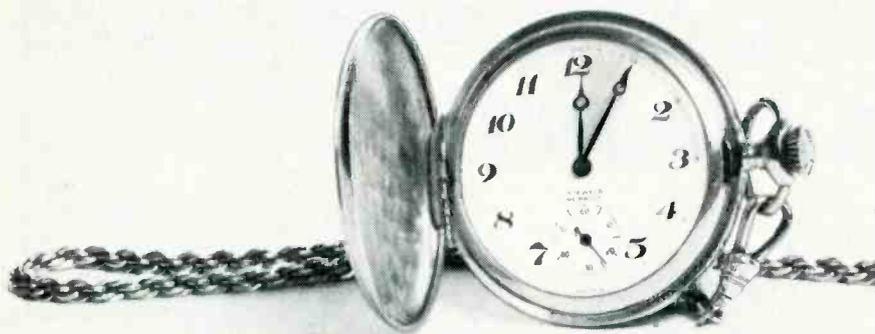
**U.S. Subscription Rates:** 1 year \$12.00, 2 years \$22.00,  
3 years \$30.00

**Other Countries:** 1 year \$18.00, 2 years \$34.00, 3 years  
\$49.00

Back issues, when available, \$5.00 postpaid.

**Audio Publishing, Editorial, Subscription, and Adver-  
tising Production offices, North American Building,  
401 No. Broad St., Philadelphia, PA 19108  
Telephone: (215) 574-9600**

**Postmaster:** Send Form 3579 to above address.



## the first 5 minutes don't count

Or even ten!  
Sometimes it may take  
a little while before you  
know just how good a  
headphone really is.

Comfort, weight, cord  
convenience all are vital  
factors in headphone  
wearability.

With every minute of  
use, any manufacturing  
deficiencies in these  
areas grow into  
discomfort and  
inconvenience.

At Beyer we know  
these problems and all  
our headphones are  
designed to achieve the  
highest possible  
wearability factor (Hi-Fi  
News, September '76,  
page 143, Beyer  
DT440 ranked 1st  
out of six  
comparative  
tests for comfort).

Coupled with physical  
comfort comes the lack of  
aural fatigue. That bright  
overdone sound  
associated with the  
'loudspeaker-on-the-ear'  
concept oversold by our  
competitors will often  
give you a bad headache  
in minutes. It takes time  
to appreciate good clean  
sound. And with time,  
good sound doesn't tire  
(Hi-Fi News, September  
'76, Subjective  
Headphone listening test,  
Beyer DT440 ranked 1st).

So visit your Beyer  
headphone dealer now  
and give yourself time to  
compare Beyer head-  
phones against the  
competition.

**But remember—  
the first  
5 minutes  
don't count!**



**Beyer Dynamic**

**Beyer Dynamic.** Distributed by Hammond Industries Inc.  
155 Michael Drive, Syosset, New York 11791. Telephone (516) 364-1900  
West Coast telephone (213) 846-0500, Canada telephone (416) 677-0545

Enter No. 25 on Reader Service Card



## No matter what system you own there's an Empire Phono Cartridge designed to attain optimum performance.

5

Detail, brilliance, depth.

This is the promise of each Empire Phono Cartridge and although there are many Empire models, each designed to meet specific turntable performance characteristics, every Empire cartridge contains the following features:

Features	Details	Benefits
Unique Fixed Unidirectional Three-Magnet Structure	Every Empire cartridge uses 3 high energy ferrite magnets in the cartridge body to provide a high level of unidirectional flux.	Higher and more linear output signal, immunity to bi-directional magnetic distortion, and improved hum and microphonic rejection.
Molded Four-Pole Magnetic Assembly	Every Empire cartridge employs a four-pole magnetic assembly that is precisely aligned and locked in place by a high pressure injection molding process... providing a uniform and orthogonal magnetic field.	Improved crosstalk and reduced distortion that is insensitive to tracking force.
Tubular moving Iron Design	By using a tubular high magnetic saturation iron armature we obtain an optimum ratio of output level to effective tip mass.	Improved tracking ability and widened frequency response.
Four Coil Hum Bucking Assembly Plus Electromagnetic Shielding	Using custom designed computer controlled machines, a precision drawn copper wire (thinner than human hair and longer than a football field) is wound onto a symmetrical 4 bobbin structure. By using 2 coils per channel a symmetrical electrical circuit is formed.	Improved rejection of hum and stray noise fields.
Aluminum Alloy Cantilever	The Empire computer designed tubular cantilever provides optimum coupling of the diamond tip to the moving magnetic system resulting in minimum effective stylus tip mass.	Superb low level tracking, reduced tracking distortion... plus enhanced wideband separation characteristics.
Precision Ground Oriented Diamond Tips	Empire diamonds are precision ground, polished and inspected in house, using sophisticated television cameras and powerful microscopes to ensure accurate angular orientation.	Reduced tracing phase distortion, together with reduced wear of both the record and the diamond tip.

For the full story on Empire cartridges we suggest you "test-listen" to one at your local Empire dealer, and for information on our full line of cartridges, write for our brochure "How to Get the Most Out of Your Records": **Empire Scientific Corp.**, Garden City, N.Y. 11530

# EMPIRE

Enter No. 21 on Reader Service Card

## Amid the confusion . . .

So much is stated, contradicted and re-stated, but in the end it is not a matter of opinion.

Other things being equal, 'goodness' can be expressed in simple terms.

A pick-up arm should have the lowest possible effective mass, coupled with the highest possible rigidity.

A cartridge should have the lowest possible effective tip mass, coupled with a correctly related compliance and tare (cartridge weight).

These are the rules of physics and engineering. They can be denied for various reasons but the penalty is then paid each time you play a record.

Immediately available. In case of difficulty write to Dept 1450, SME Limited, Steyning, Sussex, BN4 3GY, England  
*Exclusive distributors for the U.S.:* Shure Brothers Incorporated, 222 Hartrey Avenue, Evanston, Illinois 60204  
*and in Canada:* A. C. Simmonds and Sons Ltd, 975 Dillingham Road, Pickering, Ontario, L1W 3B2

**SME**

**Design Council  
Award 1978**

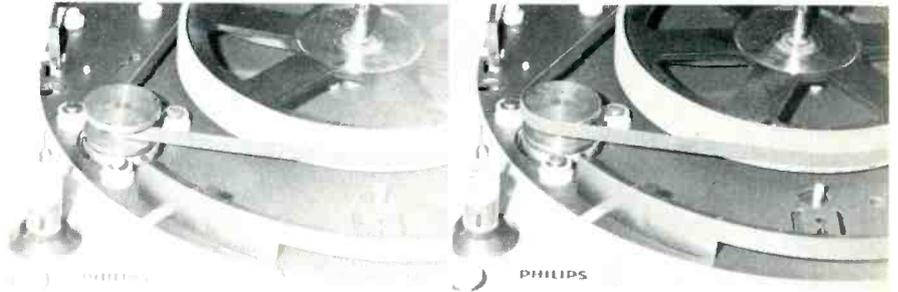
The Series III precision pick-up arm and Shure V15 Type IV cartridge. Designed and built by the rules for faithful, uncoloured musical reproduction.



"Stereo Sound is Japan's principal hi-fi magazine. The Summer '78 issue carries an article compiled by seven leading critics. Of forty-three arms they recommend the SME Series III as the best and the Series II Improved as good"

# Audioclinic

Joseph Giovanelli



## Turntable Conversion

On occasion I play 78 rpm records on my turntable, usually for the purpose of taping and preserving them. Unfortunately very few of the present high quality manual turntables have provisions for playing 78 rpm discs. Shortly after purchasing my Philips turntable I discovered a simple modification which allowed me to play 78s with ease. By moving the drive belt from the inner (Photo 1) to the outer step of the motor pulley (Photo 2), then depressing the 33 button, the platter will rotate at 78 rpm. Minor corrections in the speed can be made

with the unit's adjustment screw. I have successfully used this arrangement for the past two years. —R.F. Kilcoyne, Mequon, Wis.

You were fortunate to have a "step" on the motor pulley that was usable in making your conversion. Unless the motor pulley has just the right diameter on some normally unused portion, this procedure would not have worked. Some motor pulleys may be readily removed. Where this is possible you have the means to machine additional pulleys which can be used for 78 and 16 $\frac{2}{3}$  rpm.

## Speaker Power

**Q.** Would a speaker system need a low minimum power requirement and a high maximum power-handling capability to reproduce wide dynamic range material? — James W. Jones, Richmond, Va.

**A.** The maximum power handling capability of any loudspeaker is that power beyond which the speaker would be either overloaded or physically damaged in some way. The minimum power requirement is simply that power which is required to fill an average listening room with sound that most listeners consider to be sufficiently loud. The difference between the minimum and maximum power output, therefore, represents a power reserve for that loudspeaker, which can also account for momentary transient peaks. Assuming that the minimum power produced by your loudspeaker system is satisfactory in your listening room, then the speaker under discussion should be capable of reproducing a wide dynamic range.

## Twin Antennas

**Q.** In my remote area there are only two sources of FM signals and I want to avoid using antenna rotators. Can two antennas be mounted on one

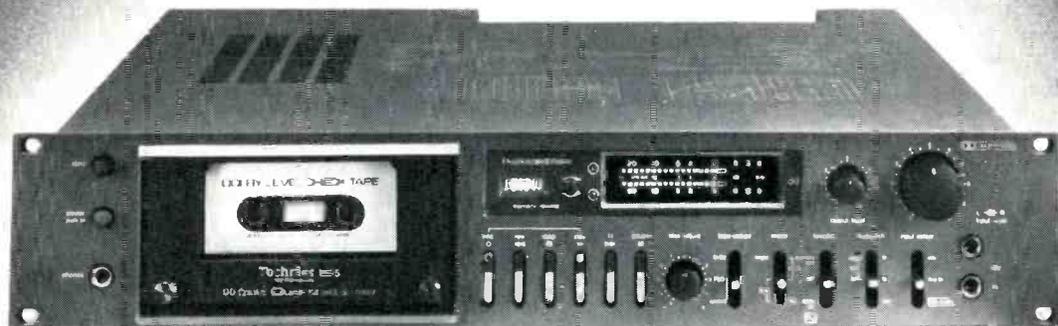
tower provided that two separate lead-ins are used? Will a switch be needed between the lead-ins or can they both be connected to the input of my equipment? — Hardy Morgan, Hico, Tex.

**A.** Because there are two separate sources of programming, you can use two directional antennas as you described. You must, however, keep them separated by a distance of at least six feet so they will not interact, and use two separate lead-in cables. It is possible to connect both lead cables to the input of your equipment. However, this gives rise to some multipath problems, as well as producing some signal loss. Therefore, it is best to arrange some kind of switching between the two lead-in cables.

If the lead-in cable is in the form of coaxial cable, there are special coaxial switches available for this application. If you are using a twin-lead, then a simple knife switch, DPDT, will work nicely.

If you have a problem or question on audio, write to Mr. Joseph Giovanelli, at AUDIO, 401 North Broad Street, Philadelphia, Pa. 19108. All letters are answered. Please enclose a stamped, self-addressed envelope.

You know what Technics quartz-locked direct drive does for records.  
Now listen to what it does for cassettes.



Accuracy good enough for even the most demanding professional, that's what Technics quartz-locked direct-drive turntables are all about. And that's why radio stations use them and disc jockeys abuse them.

Now you can record your records as accurately as a Technics turntable plays them. With the RS-M85, our new quartz-locked direct-drive cassette deck. Not only does it have the kind of transport accuracy that's hard to beat, it has that kind of price, too. The reason for all this accuracy: The performance of Technics direct drive combined with the precision of our quartz oscillator.

The RS-M85's servo-controlled system compares the motor rotation with the unwavering frequency of the quartz oscillator and instantly applies corrective torque if any speed deviations are detected.

To complement that accuracy, Technics RS-M85 has a Sendust head with a high-end frequency response of 18,000 Hz, low distortion and excellent dynamic range.

Since there's nothing ordinary about the RS-M85's

performance, there's nothing ordinary about its meters. The RS-M85 features Fluorescent Bar Graph meters. They're completely electronic and therefore highly accurate. Response time is a mere 5 $\mu$ s. There's also a peak-check mode plus two selectable brightness levels.

To all this sophistication, the RS-M85 adds all this: A separate, coreless DC motor for reel drive. Dolby NR\* Full IC log control in all modes. A low-noise high-linearity amplifier section. And a 3-position bias/EQ selector with bias fine adjustment.

Also available is Technics RF-070. An optional full function infrared wireless remote control Technics RS-M35. Compare specifications. Compare prices.

FREQ. RESP. (CrO<sub>2</sub>): 20-18,000 Hz. WOW AND FLUTTER: 0.035% WRMS. S/N RATIO (DOLBY): 69 dB. SPEED DEVIATION: No more than 0.3%.

Technics RS-M85. A rare combination of audio technology. A new standard of audio excellence.

\*Dolby is a trademark of Dolby Laboratories, Inc.

**Technics**  
Professional Series

Enter No. 65 on Reader Service Card

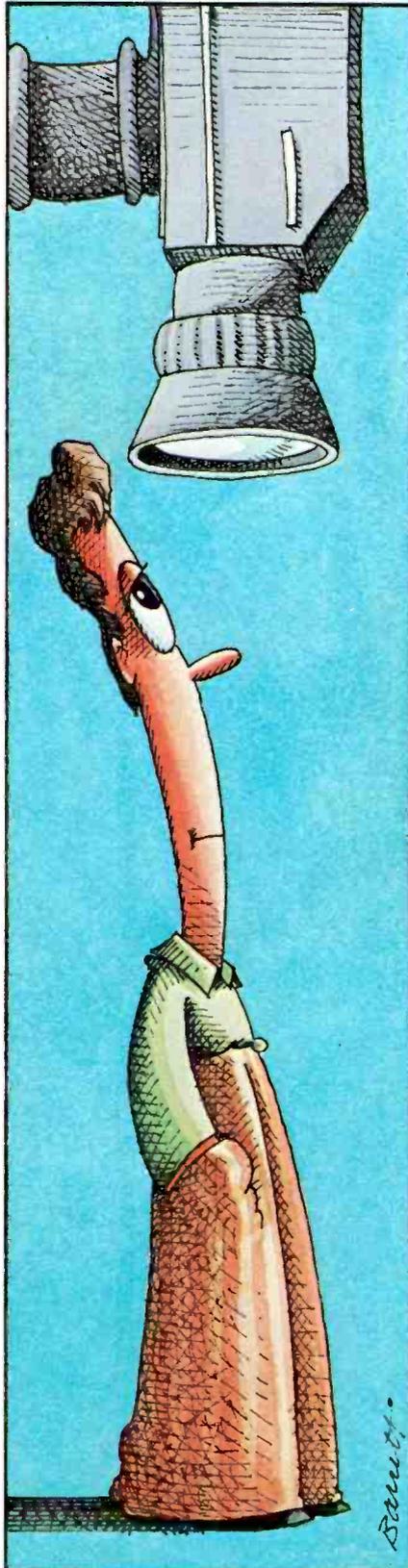
# Video Scenes

You would have to be a hermit in the Himalayas not to know that the VCR . . . the video cassette recorder . . . is an idea . . . nay, a product . . . whose time has come. VCRs have been proliferating at an astonishing rate, with something on the order of 34 distinct models now on the market.

The VHS format predominates over the Betamax format, but to be fair, it must be pointed out that many of the VHS VCRs are the offspring of a few key manufacturers, and these OEM units are basically the same model with some cosmetic differences to furnish some degree of brand identification for the various units.

Sony's Betamax was the pioneering system that created the market for the VCR. With the arrival of the competing VHS VCRs on the scene, the Betamax has undergone several revisions and updatings. The new Sony SL8600 Betamax is the third generation of their VCR, and I have had the pleasure of using one of them for the past few months.

The Sony SL8600 is a considerable refinement over the early Betamax models. Gone is the clumsy "add-on" program timer, which was an extra cost option. Now there is a standard integral, electronic, digital read-out timer, with a 12-hour clock cycle synchronized with the power frequency. The SL8600 is mounted on an attractive case, finished in shades of brown, which measures  $18\frac{3}{8}$  X  $7\frac{3}{4}$  X  $16\frac{1}{8}$  inches and weighs *in toto* a substantial 38 pounds. Operating controls on the SL8600 are of the mechanical "piano key" type, and reading from left to right there is the *Eject* button, which when depressed causes the entire cassette compartment to rise out of the center of the machine. After a standard Betamax format half-inch videocassette is inserted into the compartment, the assembly is manually pushed back into the recorder, and with a whirl and a click, the videocassette is automatically threaded into the tape path. Next button is for *Rewind*, then *Stop*, *Play*, *Record*, and *Pause*, whose functions are self-evident. However, it should be noted that unlike many VCR units, wherein the record mode is entered by simultaneously depressing a *Play* and *Record* button, on this unit the one *Record*



button does it all. Other controls on the SL8600 include separate VHF and UHF tuner channel selectors, with the VHF tuner covering the usual channels, 2-13 and the UHF channels, 14-83. The VHF output signal can be either channel 3 or 4, whichever affords the best quality. There is a tape counter and a *Memory* switch which functions in the same manner as those on an audio cassette recorder. A program selector switch is provided to activate either the TV set or the VCR. There is a VHF fine-tuning control and an AFT (automatic fine tuning) switch to be used in conjunction with it. On a selected channel, the AFT switch is defeated, and the fine-tuning knob is depressed and rotated either clockwise or counter-clockwise until the sharpest picture is obtained. Then the AFT is engaged to "lock" in the fine tuning. It is easy to use and quite effective. A tracking control on the front panel has a center detent position, which is normal for videocassettes recorded on the machine. If, when playing back tapes from other Betamax units or for prerecorded videocassettes, "snow" appears on the TV screen, adjustment of the tracking control usually corrects this condition. Of course, the tracking control is returned to the detent position when normal playback is resumed.

A remote control *Pause* function is provided on the SL8600, and the handheld control that plugs into the unit is very handy for deleting "unwanted program" in the polite language of copywriters, but otherwise known as "commercials." The electronic timer, with its luminous red digital read-out, is on the front panel so that the TV viewer can use it as a normal clock. In fact, the dust cover of the unit has a cut-out for the timer, so that the clock is not obscured. Nice touch! The timer has easy-to-set controls so that unattended recording is a simple matter.

The rear panel of the SL8600 has input jacks to accept VHF and UHF antenna inputs, via 75-ohm coaxial cable or 300-ohm twin-lead with appropriate adaptors supplied. There are VHF outputs to connect with the standard antenna input on TV sets. There are also audio input and output jacks for external audio sources. Input and output jacks are provided for video cameras,

# THE JVC RECEIVER.

Every bit as revolutionary as they look, and then some.

In our case, looks are never deceiving. Because all our new DC integrated stereo receivers combine unprecedented, revolutionary styling with unique electronic design features that reflect JVC's more than 50 years' experience in audio development and innovation.

## DC Power Amplifier Design

All four new JVC receivers feature DC amplifier circuitry. They offer virtually distortion-free performance (0.03% THD) throughout the entire audible spectrum. As a result, the sound you hear is clearer, cleaner and crisper. In addition, your speakers are protected with the Triple Power Protection circuit and you can monitor output wattage with dual power meters. Choose from 120, 85, 60 and 35 watts/channel.\*

## SEA all the way

All four receivers offer JVC's exclusive built-in SEA five-zone graphic equalizer for more complete control of

the music spectrum than conventional tone controls. You can attenuate or accentuate any of five separate musical bands, and as an added feature, we've incorporated a special button so that the SEA circuit can be switched to your tape deck.

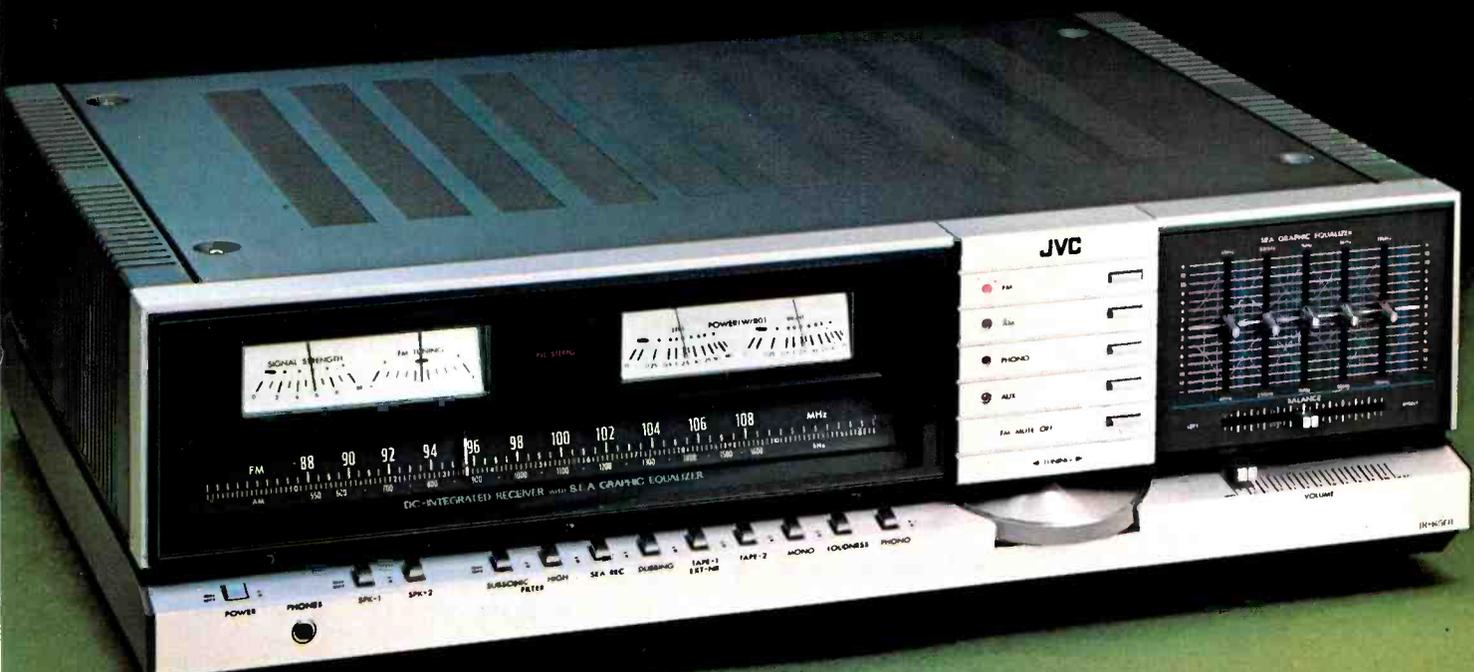
## Pushbutton Source Selectors

A horizontal panel of pushbuttons provides total control over all functions. And brilliantly illuminated LEDs instantly indicate the program source. Professional-type slider controls set volume and balance. Combine all these exclusive features with high sensitivity and tuning precision, thumb control tuning wheel and accurate dual-metering and you'll see just how revolutionary the new JVC DC integrated stereo receivers are. Play one at your JVC dealer soon. JVC High Fidelity Division, US JVC Corp., 58-75 Queens Midtown Expressway, Maspeth, NY 11378. In Canada: JVC Electronics of Canada, Ltd., Ont.



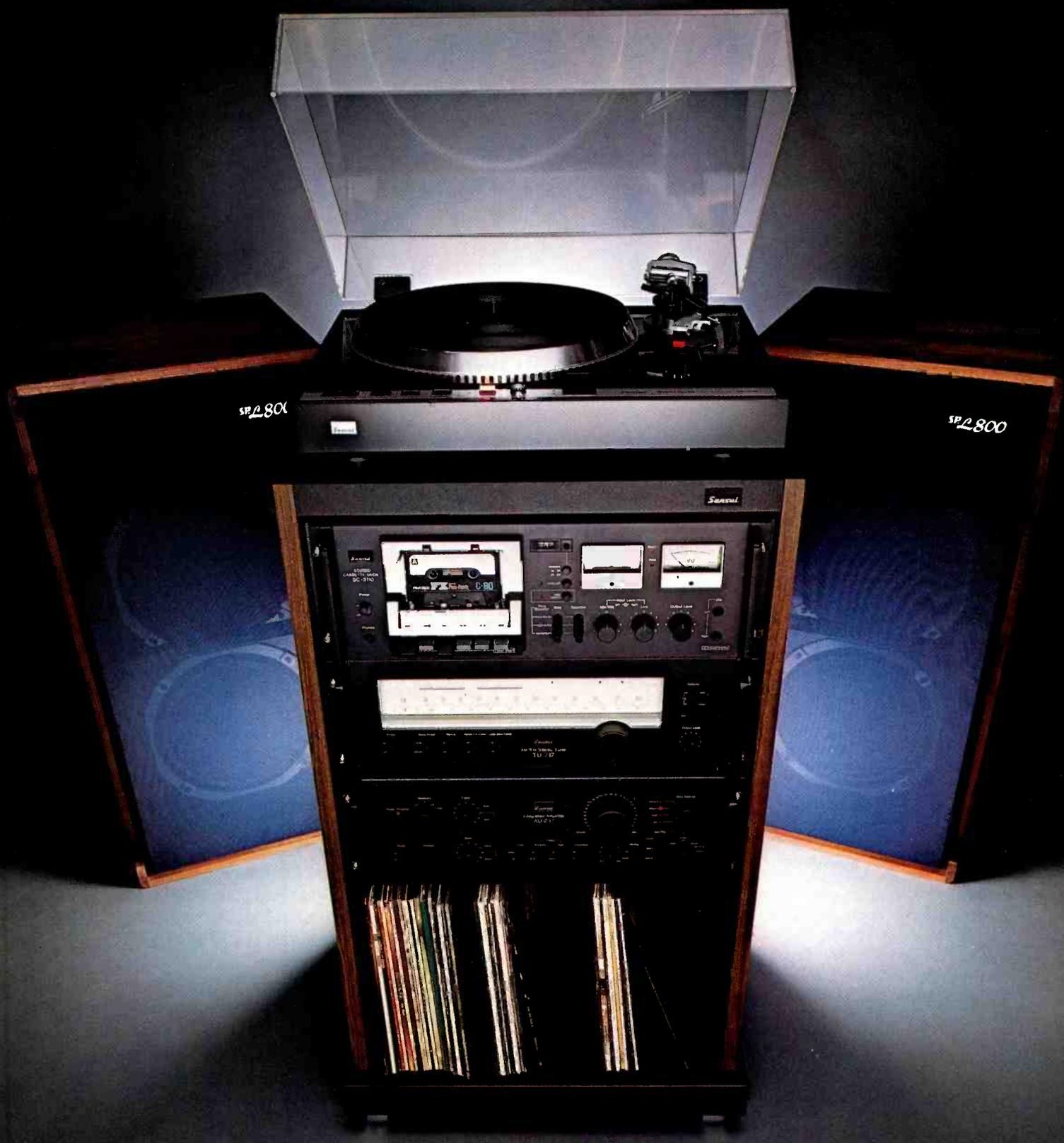
JR-S 401 (top); JR-S 201 (bottom left) & JR-S 301 (bottom right).

# JVC



JR-S501 \* @ 8 Ohms, both channels driven from 20Hz-20 KHz, with no more than 0.03% THD.

Enter No. 30 on Reader Service Card



# A new Space Program by Sansui.

## Designed to send every audiophile into orbit.

Sansui has conquered space — the space in your listening room. Our engineers have created a rack to hold all your high fidelity components in one place so they're easily accessible and easy to operate. And the Sansui GX-5 rack is so elegant you will be proud to display it in your home.

The **Sansui GX-5 rack** is about the only EIA 19" standard-width rack available with casters for moving your sound system easily from room to room. It is 37-1/2 inches tall and can hold every rack-mountable component. You can also adjust the height of each unit to meet your needs.

We have filled the rack with our choice of outstanding Sansui components. And there's still plenty of room for your records. Listen to them on the **Sansui SR-838 Quartz-Servo direct-drive turntable**, about the most elegant and stable precision turntable in the world. Even when set on top of so much power, the SR-838 will perform free from all noise and feedback.

When your mood changes, listen to your favorite FM station on the **Sansui TU-717 tuner**. Reception, even of the weakest stations, is outstanding, with selectivity so high there is never a problem with adjacent channel programming.

And, of course, if you want to preserve these treasured sounds for years — as clean and pure as they were the very first time you heard them — it's all possible with the **SC-3110 cassette deck**, our rack-mountable version of the SC-3100, already well-known for its superior performance and ultraconvenience including Sansui exclusive Direct-O-Matic loading.

To match these outstanding components, Sansui offers you the **AU-717 amplifier** with the widest frequency response (from main-in) of any available **DC integrated amplifier** at any price. With astonishingly low distortion and noise, and wide overall frequency response, the signal is an ultra-faithful replica of the original. The AU-717 delivers the brilliance and all the nuance that makes music so important in your life.

Listen through a pair of **SP-L800** (or SP-L900 or 700) **dual-woofer speaker systems\*** They have been designed to give you the full enjoyment of the clean and pure sound that our advanced technology components provide.

Of course, you can select other components to meet your own listening needs. You may want slightly less power; so we offer you the AU-517 DC integrated amplifier, created with the very same expertise as its bigger brother, the AU-717. If you wish to spend a little less on your cassette, you can choose the SC-1110.

And for you recordists and musicians we have something almost out of this world. The **AX-7 mixer/reverb unit** is about the finest home recording console that you can find at such a reasonable price. Versatility is the key, with up to 6 inputs for microphones, line level, electrical instruments, discs, broadcasts or tapes. You get panpots and



20dB input level attenuators on the 4 main inputs. Reverb is included, as well as circuits for 4-channel, equalization and noise reduction. Record the sounds you create on up to 3 tape decks.

We're sure you'll want to visit your local franchised Sansui dealer for a complete demonstration of Sansui's new Space Program. Just think about it. It will send you into orbit.

\* Walnut veneer finish

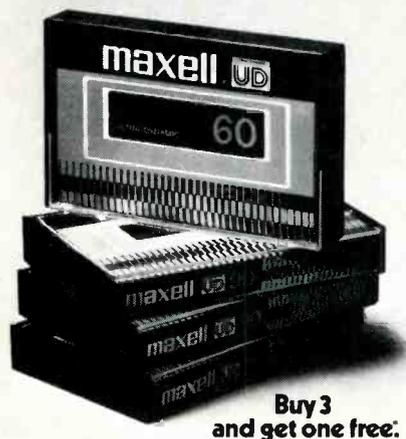
### SANSUI ELECTRONICS CORP.

Woodside, New York 11377 • Gardena, California 90247  
SANSUI ELECTRIC CO., LTD., Tokyo, Japan  
SANSUI AUDIO EUROPE S.A., Antwerp, Belgium  
In Canada: Electronic Distributors

The Sansui logo, featuring the word "Sansui" in a stylized, italicized font with a green outline, set against a dark green rectangular background.

Enter No. 52 on Reader Service Card

**A tape offer  
that sounds  
as good as  
the tape.**



**Buy 3  
and get one free.**

16

A lot of tape companies can make you an offer that sounds like this.

But not tape that sounds like this.

Because our new Maxell UD cassette should be considered among the world's finest recording tape.

You see, Maxell cassettes are built to higher standards than necessary. They're designed to give you recordings free of noise, dropouts and trouble.

So buy three Maxell UD 90's, and get a UD 60. Free.

If you think our offer sounds great, wait till you hear our tape.



\*Available at participating Maxell dealers.  
Offer expires December 22, 1978.

Enter No. 33 on Reader Service Card



## LeKashman Dies

Larry LeKashman died after a brief illness Sunday, Sept. 24, 1978. At the time of his death, he was Vice President of Marketing and Sales at Electro-Voice, Inc. His early career started as Radio Editor for *Aero Digest*; continued through writer and consultant for Raytheon Manufacturing; Vice President and General Manager for Radio Magazines, the publisher which started *Audio Magazine*, and progressed to Manager of Advertising & Sales for RCA Victor Tube Division. First joining Electro-Voice on October 16, 1951, as V.P. Sales, LeKashman guided the company into the position of being one of the marketing leaders in the high-fidelity speaker industry. After several departures and returns, LeKashman advanced to the position of V.P. Marketing and then to President of Electro-Voice, a position which he held from 1969 to 1971. During this period, he guided several innovations in high fidelity technology, including matrixed four-channel stereo.

LeKashman's contributions to the electronics field are substantial. He had more than 100 technical articles published, was editor of two technical handbooks, and held patents and copyrights on three navigation calculators and radio direction-finding aids.

His major contributions for E-V, however, were the introduction of the first mass-produced stereo phonograph cartridge in 1958 and, on a broader scale, bringing the flair of consumer-goods marketing to the high fidelity industry. Products introduced during this period included E-V's famous Patrician, Georgian, and Aristocrat speaker systems.

Many marketing techniques that are now commonplace were LeKashman innovations. Allied Radio was one of the first companies to carry hi-fi speakers that were manufactured and private-labeled by another company — Electro-Voice. Carrying both the Electro-Voice and Knight names, this represented the first attempt by a hi-fi manufacturer to increase market penetration by offering private labeled products in the retail market. His time with Teledyne/Olson Electronics, and later with Lafayette Radio, saw many strong advances in hi-fi direct-mail marketing.

LeKashman's return to Electro-Voice in October of 1977 brought new life to the firm's high fidelity speaker business. It is regrettable that one of the founding directors of the Institute of High Fidelity could not have stayed in the business a bit longer. He is survived by his wife, Priscilla, and two daughters.

# TWO SPEEDS!

**B·I·C introduces the two speed cassette deck — 1 $\frac{7}{8}$  ips for compatibility, 3 $\frac{3}{4}$  ips for extraordinary performance.**

Recording engineers recognize that the way to obtain more professional results is to increase the speed at which tape is moved past the heads.

Until now, all conventional cassette decks have recorded and played back at 1 $\frac{7}{8}$  inches per second only. The new B·I·C tape decks do this... superbly. When used at 1 $\frac{7}{8}$  ips, they exceed virtually every existing performance spec. At 3 $\frac{3}{4}$  ips, they establish new standards.

This faster tape speed results in dramatic improvements in frequency response, dynamic range, signal-to-noise, and wow and flutter. It also provides much quicker rewind and fast forward times, automatically at either speed.

As an example, consider the model T-3's 3 $\frac{3}{4}$  ips specs. Performance unheard of

in any other cassette deck. Guaranteed frequency response of at least 25-22,000 hz  $\pm$  3 dB. Wow and flutter less than .035% WRMS. Total harmonic distortion below 1.5%. Signal-to-noise ratio better than 67 dB (A-weighted).

To achieve these new performance standards we used a fresh approach to the electronics. The result — a group of new circuitry concepts which we have named "Broadband Electronics." These circuitry concepts lower residual noise and distortion. They enhance frequency response and stereo imaging. And — most important, these improvements are audible at either speed on all B·I·C tape decks.

The result is sound that is cleaner and more detailed than you have ever heard from cassette tape.

There are three B·I·C cassette decks, from the "no frills" Model T-1 at under \$300, to the 3-head, dual capstan T-3... all at prices you'd expect to pay for an ordinary one speed machine.

For a free 24-page brochure, see your B·I·C dealer or write B·I·C/Avnet, Westbury, N.Y. 11590.

**Twice the speed.  
Twice the versatility.  
Twice the performance.**

**THE NEW B·I·C  
TWO-SPEED  
CASSETTE DECK.**

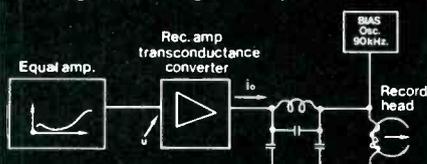


Enter No. 7 on Reader Service Card

# Tandberg Presents ACTILINEAR Recording

Open reel & cassette recorders can no longer be looked upon as add-on units in today's extremely sophisticated high fidelity sound systems, but rather as components within a total system with performance capability as technically advanced as all other components of that system.

In order to achieve this, Tandberg has developed a completely new tape recording technology known as the ACTILINEAR (Patent pending) System, the only recording technology available on the market today that can fully exploit the new high coercivity metal particle recording tape being developed.



More pertinent right now is the fact that Tandberg's new ACTILINEAR System, when used with the soon-to-be-available metal particle tape, offers performance parameters approaching those of experimental PCM technology, yet is compatible for playback on all existing tape recorders.

In conventional recording systems, the summation of record & bias current in the record head is done through passive components, leading to compromise solutions which have their distinct and pronounced weaknesses.

Tandberg engineers have developed a new recording technology without compromises. In the new ACTILINEAR System, the passive components have been replaced with an active Transconductance amplifier. Among the benefits of this new approach are:

- Up to 20 dB more headroom
- Less intermodulation due to Slew Rate limitation
- Improved electrical separation and less interference between the bias oscillator and record amplifier
- No obsolescence factor — useable with any type of tape, available now or in years to come

With its unequalled 30 year tradition in tape recorder technology, Tandberg has always been recognized worldwide for its quality products. And now, with the superior performance advantages of the ACTILINEAR System in Tandberg's new TD 20 A open reel deck, as well as the TCD 340 A and TCD 340 AM cassette decks, you will for the first time be able to achieve tape recorder performance capability equal to or better than all other components in a sophisticated sound system.

Tandberg of America, Inc., Labriola Court, Armonk, N.Y. 10504

## TANDBERG

Enter No. 63 on Reader Service Card

Herman Burstein

# Tape guide

Readers who sent letters to Herman Burstein between the third week in July and the middle of September and haven't received a reply at the present time . . . should please write again. The U.S. Postal Service lost quite a few of these letters for Mr. Burstein and we don't, of course, know whose letters they were.

### Deck Decision

*Q. I'm basically interested in a tape deck that is ruggedly constructed, has superior frequency response, low noise, low wow-and-flutter, convenient features, and long playing time. I am now trying to decide between a deck which takes 10½-in. reels and one which takes 7-in. reels but has automatic reversing. — Nicholas Jones, Charleston, S.C.*

*A. If your aim is to have extended recordings with a minimum interruption for changing or turning over reels, your best bet is probably a deck that accommodates 10½-in. reels. Also a machine designed to operate in one direction has a somewhat better chance of giving top performance than one designed to operate in both directions.*

### Taping Trauma

*Q. Using two microphones about 15 feet apart feeding into the low impedance inputs of my open-reel deck, I recorded a church choir with pleasant results except for some excessive tape hiss. In order to get adequate volume from the soloists I had to turn up the recording gain control about two-thirds of the way. At this point the noise level gets too audible on the quiet parts of the recording. I suspect that if I could amplify my signal a little before it gets to the recorder, I could improve my signal-to-noise ratio. If my theory is correct, I could obtain better final results by using a mixer; is this correct? — Leonard Blanchard, Clayton, N.Y.*

*A. Whether a mixer will improve the signal-to-noise ratio depends upon*

how quiet its electronics are. If they are quieter than those of your recording amplifier you may be able to audibly improve the signal-to-noise ratio of your recordings. Another possible answer would be to use microphone step-up transformers (mounted at the tape deck end of the microphone cable) and feed these into the high-level inputs of your tape deck. Still another suggestion is to add a noise reduction unit.

You should keep in mind that when recording live material with a full dynamic range, tape system noise during the quiet passages is apt to be more evident than when recording compressed material, as from a record or FM station.

### Signal Loss

*Q. My problem is a gradual loss of signal level on my tapes. The signal level drops off a bit, then seems to stabilize at this lower level. Sometimes, though, the signal level is further down in some spots than in others, giving an up-and-down effect in playback. This problem occurs more in some tapes than others. — Terrell Cook, Spartanburg, S.C.*

*A. Magnetized heads and dirty heads, particularly the latter, can account for your problem. Dirt causes separation between the tape and the head resulting in reduced response, especially at high frequencies. Thus, to an extent, varying volume might correspond to varying frequency content of the recorded material. Magnetized heads or other magnetized parts of the tape deck contacted by the tape can cause signal loss. Therefore periodic cleaning and demagnetization are required, usually after about eight hours of use. Some tapes shed less oxide than others so they present less of a problem in the tape-to-head contact. It is possible that the tapes which give you trouble have come from an imperfect batch, so that non-uniform oxide coating is causing your volume variations.*

If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 401 North Broad Street Philadelphia, Pa. 19108. All letters are answered. Please enclose a stamped, self-addressed envelope.

AUDIO • December 1978

# The best tape decks in the world are only as good as this tape.

While there's a lot of controversy over who makes the world's best tape deck, there's very little over who makes the world's best tape.

Maxell.

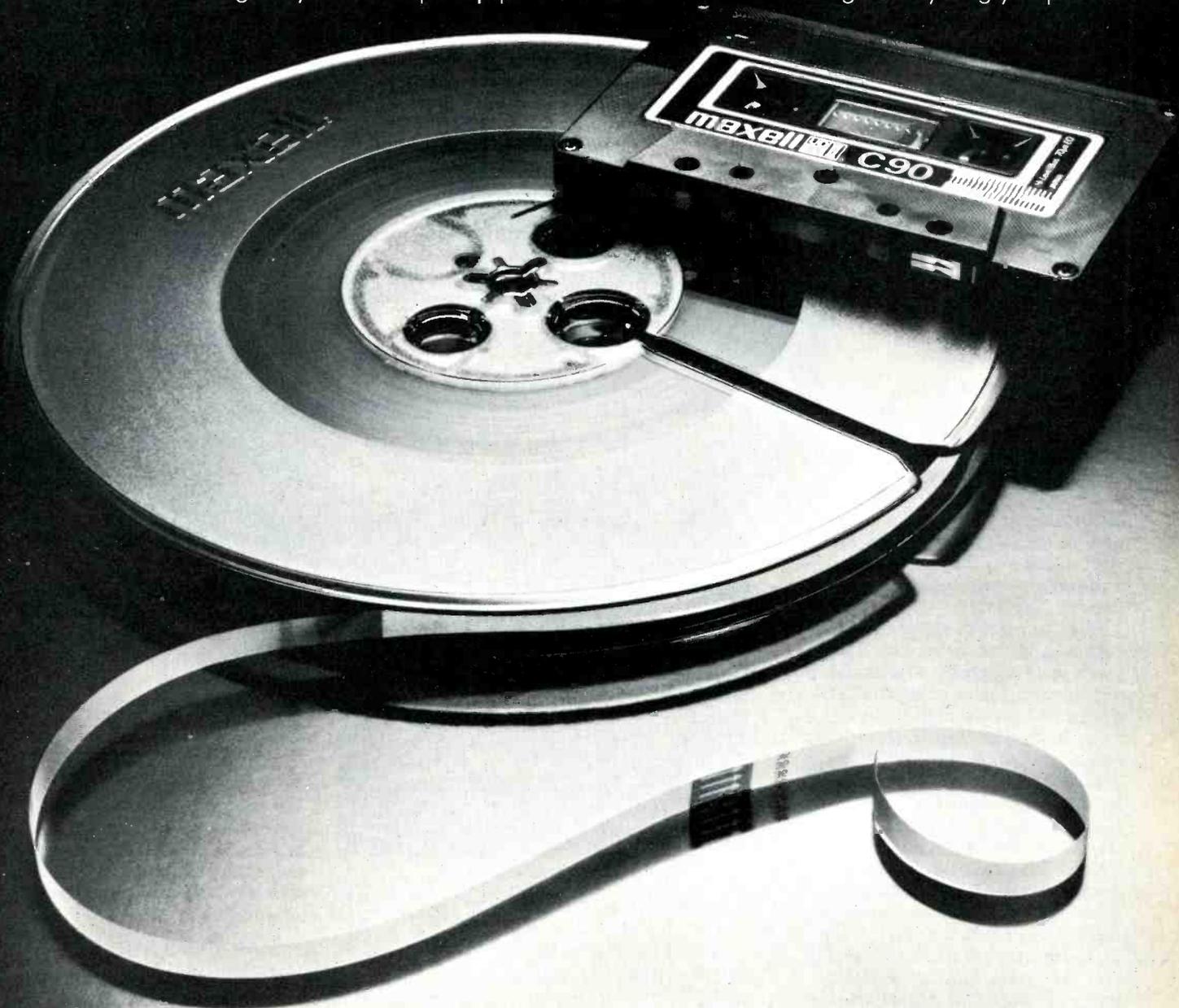
Because Maxell gives you the

widest frequency response, the highest signal-to-noise ratio and the lowest distortion of any tape you can buy. In fact, people who own the finest high-performance tape equipment use our

tape more than any other brand.

So why buy one of the world's finest tape decks and get less than the world's best sound.

When you can use Maxell and get everything you paid for.



Maxell Corporation of America, 60 Oxford Drive, Moonachie, N.J. 07074.



Enter No. 34 on Reader Service Card

# See why TDK

It's the little things you can't see  
that make a big difference in the way it sounds.

At first glance different brands of tape look pretty much alike. But if you look closely, you'll find there are many subtle differences. And it is these differences that make one tape stand out above all others.

Now you might not spend a lot of time looking closely at tape. But we have to—that's our business. At TDK we're committed to constantly improving our products. For years, our SA cassette has been the High bias reference standard for almost all quality cassette deck manufacturers. Yet we've incorporated improvement after improvement into SA's tape and mechanism since its introduction as the first non-chrome High bias cassette in 1975. These advances mean better quality sound for you. TDK makes this possible, by continuous attention to the little things you can't see.

## The Particles

The lifeblood of recording tape is microscopic magnetic particles that can be arranged in patterns to store and reproduce sound. At best, they are as small as possible, uniform in size and shape; they are long and narrow (the greater the ratio of length to width, the better); and they are tightly, uniformly packed together, with no gaps or clumps.

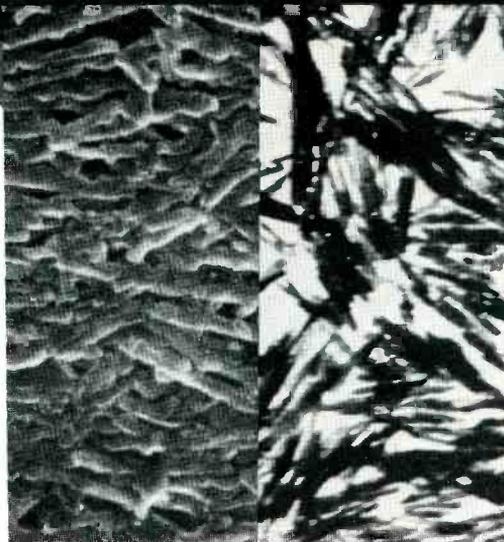
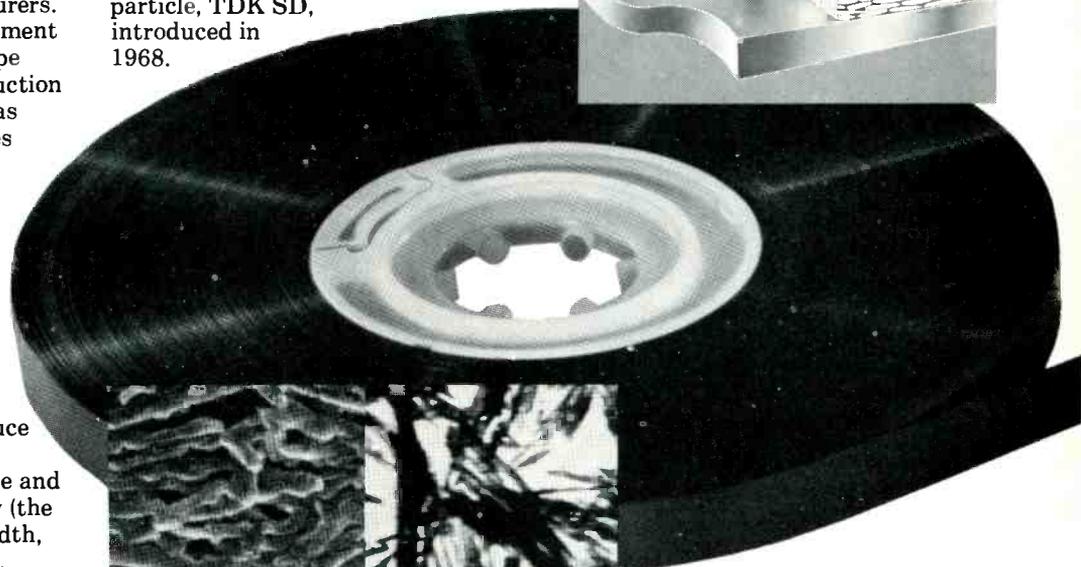
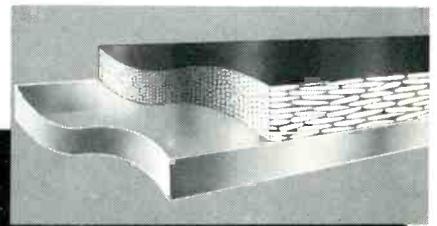
Over 40 years of experience in magnetic ferrite technology and 25 years in developing and manufacturing recording tape, bring the TDK SA and AD cassette particle formulations as close to these ideals as current technology will allow.

The TDK SA particle is a cobalt gamma ferric oxide compound made highly stable by our proprietary cobalt-ion adsorption process. The SA particle possesses one of the greatest length/width ratios of any particle used in audio cassette recording: an amazing 11:1. These little wonders are truly "state-of-the-art," and mean higher maximum output level (MOL), higher signal-to-noise and lower noise.

The particle in TDK AD is *pure gamma ferric oxide*; it has been developed specifically for use in Normal bias decks—in the home, car, in portables. With a length/width ratio of 10:1, the AD particle can deliver what most conventional cassettes lack: an extended, hot high end, to capture all the elusive highs in music, from classical crescendo to raging rock and roll. It is the logical successor to the world's first high fidelity cassette tape particle, TDK SD, introduced in 1968.

clumps nor gaps of oxide build-up. So we suspend our particles in a unique new binding, and we're fanatic about the way we do it. TDK engineers and craftsmen wear surgically clean robes and caps, and we vacuum the air to eliminate

Tape layers: coating (top); backing.



TDK SA tape surface (left) enlarged 30,000 times. TDK Super Avilyn particles (right) enlarged 20,000 times.

contaminating foreign matter and disruptive static charges. The high packing density that results means that the tape is prepared to handle high input level musical peaks gracefully, and without distortion.

## The Base Film

We coat our oxides on broad rolls of supremely flexible, but nearly stretch-proof polyester film, to make sure TDK cassettes don't tangle or introduce wow and flutter.

## The Polishing

After each roll is coated, it goes through a polishing process called "calendering." Any oxide is removed,

## The Coating

To best attach the particles to the film used for backing, it's necessary to coat that film evenly, with neither

# sounds better.

and the surface is smoothed to reduce tape head wear and oxide shedding. Reduced friction across the tape heads means lower noise.

## The Edge

If you look closely at the edges of TDK's tape, you'll find that they are uniformly straight and parallel to a tolerance of one micron. That's because we slit our tape by pulling it across an array of precisely-positioned, surgically-sharp knives. That means the tape movement is unimpeded; and mis-tracking that could result in garbled stereo is eliminated.

## The Hub/Clamp Assembly

TDK has met a major challenge which has always faced cassette manufacturers:

anchoring the tape to the hub without causing mechanical problems. We use a unique double clamp system we pioneered. It practically eliminates wow and flutter, distortion, drop-outs and other problems related to poor winding. Some manufacturers use plastic pins jammed into notches on the edge of the hub. This system can lead to uneven winding, which causes the edges to feather, the tape to bulk unevenly, and occasionally, to snap at the anchor.

## The Cleaning

Like most leader tape, ours is designed to protect the recording surface from stress, and to provide a firm anchor to the hub. Unlike most leader tape, TDK's cleans your recorder heads as it passes by.

## The Splice

Our splices are firm, with leader and tape lined up exactly. Our splicing tape is specially designed not to bleed adhesive into the cassette mechanism, which could gum up the works.

© 1978 TDK Electronics Corp.

## The Inspection

Before any of our tape is loaded into cassette shells, it must pass a series of inspections to



The TDK double clamp system.



The TDK high tolerance tape/leader splice.

see if it matches up to our own rigorous standards. If it doesn't pass, it's discarded. We never compromise on quality.

## The Music and the Machine

We go to more trouble than most companies do, when we manufacture our cassettes. We see to all the little details, so you can hear more of your music. Our super precision cassette mechanism delivers the tape to your heads precisely, without introducing friction, wow and flutter and other problems in the process. And we back that mechanism, and the tape within it, with high fidelity's original full lifetime warranty\*, a measure of the value we have placed in our cassettes, for over 10 years.

So next time you buy cassettes, look closely at TDK, and think of all the little things you can't see that make our cassettes just that much better. TDK Electronics Corp., Garden City, NY 11530. In Canada: Superior Electronics Ind., Ltd.

\*In the unlikely event that any TDK audio cassette ever fails to perform due to a defect in materials or workmanship, simply return it to your local dealer or to TDK for a free replacement.



# TDK®

The machine for your machine.®

Enter No. 67 on Reader Service Card

# Audio etc.

Edward Tatnall Canby

As I said last month, when you can no longer spread out your recordings luxuriously all over your living room because there are too many and you can't find anything in the mess — then, indeed, you have come to the beginning of the end. You *must* organize your home library.

I may have seemed facetious last month but was not really. I was merely being literal. As our home systems wax bigger, so do our record collections, in spite of inflation, slowly but surely, like children growing. You hardly notice the difference from day to day, but —. A mere record cabinet, a length of tasteful shelving, a box built to order, these are merely continuing symptoms of trouble, temporary substitutes for the luxury that is lost, those tables and chairs and couches piled high with the goodies, right within reach where you could find them — or so you used to think. You still can't find them. What you need is more than neatness. It is ORDER. And quick access. But please, no file cards.

Now I will admit that before you get to any such pass, there is a vast gray area, for perhaps three quarters of us, whereby our records and tapes are "filed" in a sense but in an exceedingly loose-limbed fashion, not so much by system as by feel and a vague area-memory. Show tunes at one end of a pile, Vivaldi at the other, and misc. in between. This is just fine, as long as it works for you. People do get very good at riffling through. I am writing, though, for the prognosed future, which is not good, unless you stop collecting altogether.

Why not just put the records in order — some order or other — and let 'em sit? As is. Well, you can try. But the companies have ten thousand ways to confuse you. And ruin your eyesight as well as your composure. There is nothing uniform about the info they put on the product. Covers are nice but mainly for sales. Spines? That skinny, barely visible line of information is supposed to help when you shelve your discs in close order. Half the spine copy is upside down, not to mention around the corner, on front or back, and all of them are sidewise, some to the right, some to the left; you crane your neck first one way and then the other, or stand on your head. Some are blank and more are rippled so only the tops of the letters show, unreadably. The light is always wrong and the focus fuzzy. *Not* spines.

How about a nice loose stack on the floor, or in an open box, so you can look down and riffle through, looking at the covers. It works if your records are very loosely stacked. But then, you see, they fall sidewise against each other and the considerable weight is dangerous. Warping. You're beat before you start, here too. Tighten up the stack, and you can't see the covers, or anything else. In the end, you're going to have to try something on your own, to get both order *and* visibility, which

means accessibility. So let's try home-made labels. Gummed labels, or self stick. They take only a moment to put on, and what counts is the code you put on them. It can be fun. You make it up.

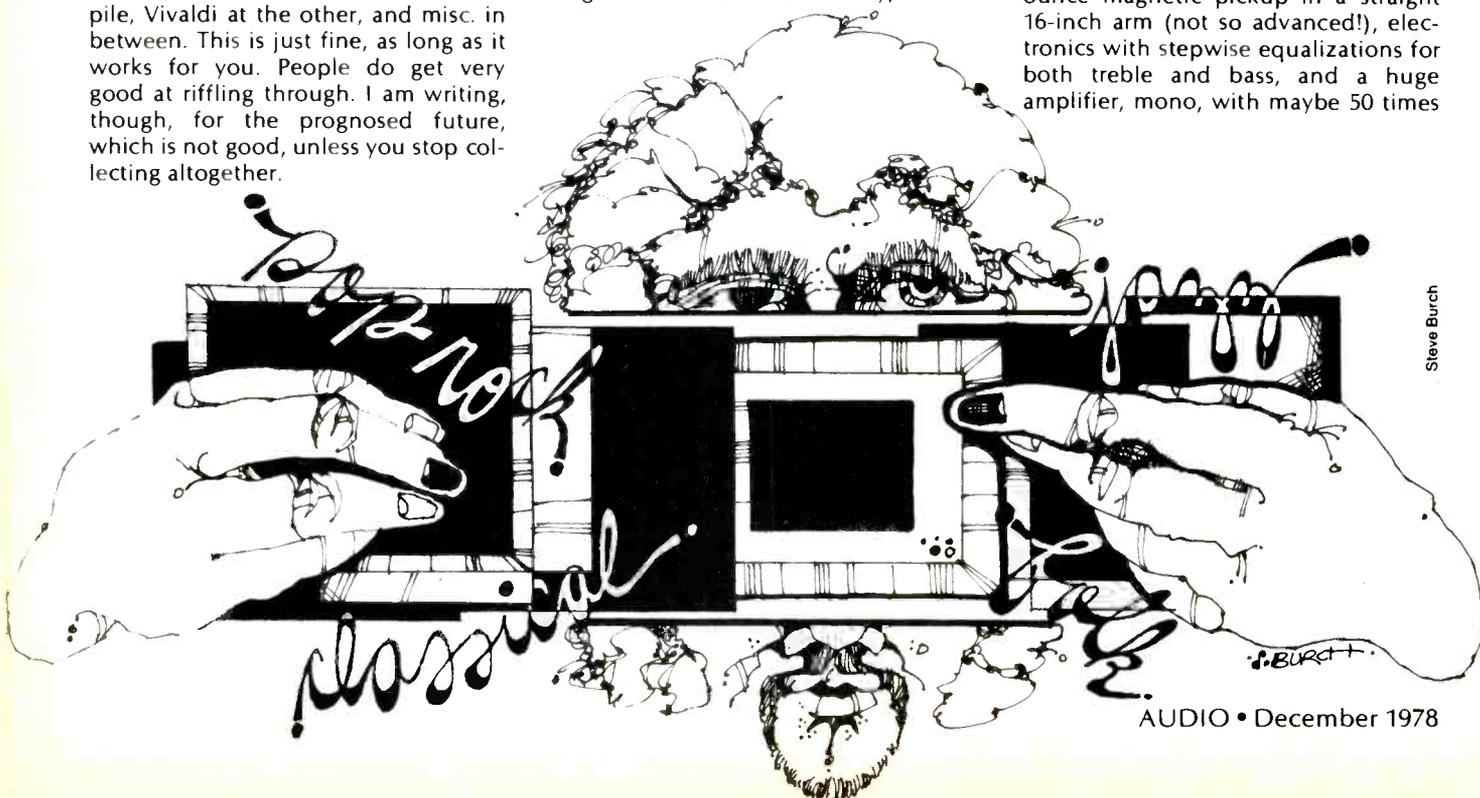
## Coding The Carnegie

There's a tricky way of making a code that I learned the hard way, long ago in my very first job, as an assistant in an Ivy League college music department. This was in the Thirties. When I got there, the Music Department was just getting started, after a century of musical darkness at that distinguished institution, and we had landed a fish — we got the famed Carnegie Collection, literally thousands of 78 records, given to schools and colleges that could use them for teaching and as a loan library. Old Andrew Carnegie, you remember, more or less founded the U.S. public library system; now, for the first time, it was audio, recorded music.

That Collection was stupendous for its day. Not only all those records but also a player, a veritable Jaws of a player, the d—dest machine we'd ever seen and 30 years ahead of its time.

In 1936 it already came as components. One big box held a monster turntable, recording-lathe type, a 10-ounce magnetic pickup in a straight 16-inch arm (not so advanced!), electronics with stepwise equalizations for both treble and bass, and a huge amplifier, mono, with maybe 50 times

22



Steve Burch

AUDIO • December 1978

# PHASE LINEAR SETS THE STANDARD FOR HIGH POWER.

Current loudspeaker design theory takes for granted the availability of a high power reserve. An idea once considered frivolous by many. Today it is considered essential for the best possible reproduction of recorded material.

To reproduce a musical peak, a loudspeaker requires up to 10 times the average power being delivered. If the amplifier lacks a sufficient power reserve, it will clip, producing distortion and audibly destroying sonic quality.

The Phase Linear D-500 Series Two Power Amplifier is capable of delivering 505 watts per channel from 20Hz-20kHz into 8 ohms, with no more than 0.09% Total Harmonic Distortion. That's unsurpassed power for unsurpassed realism.



CONVENTIONAL  
OUTPUT  
TRANSISTOR.



D-500  
OUTPUT  
TRANSISTOR.

The D-500 utilizes an advanced design in output devices to overcome the problems associated with amplifier clipping at realistic listening levels. As a result, the power handling capability is greatly improved. In fact, the power semiconductor complement of the D-500 features the highest power handling

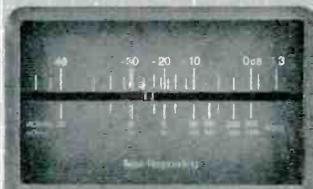
capability in the audio industry.

A massive rear mounted extruded aluminum heat sink assembly protects the 36 output devices against overheating and includes a self-contained, thermally activated forced



air cooling system. You don't have to worry about over-heating under normal operating conditions.

Instantaneous indication of output activity is easily maintained with an exclusive 32-segment LED display,



while a special 4-segment clipping indicator warns of hazardous overloads. High/Low Impedance. Operation modes are automatically,

or manually activated for increased amplifier efficiency when using low impedance speakers.



## HEARING IS BELIEVING.

See your local Phase Linear dealer for the most powerful argument for the D-500: a demonstration.

## SPECIFICATIONS.

OUTPUT POWER: 505 WATTS  
MINIMUM RMS PER CHANNEL  
20Hz-20,000Hz INTO 8 OHMS,  
WITH NO MORE THAN 0.09% TOTAL  
HARMONIC DISTORTION

CONTINUOUS POWER: 1000Hz per  
channel, with less than 0.09% Total  
Harmonic Distortion:  
8 ohms - 600 watts  
4 ohms - 800 watts

INTERMODULATION DISTORTION:  
0.09% Max (60Hz: 7kHz = 4:1)

DAMPING FACTOR: 1000:1 Min

RESIDUAL NOISE: 120uV (IHF "A")

SIGNAL TO NOISE RATIO:  
110dB (IHF "A")

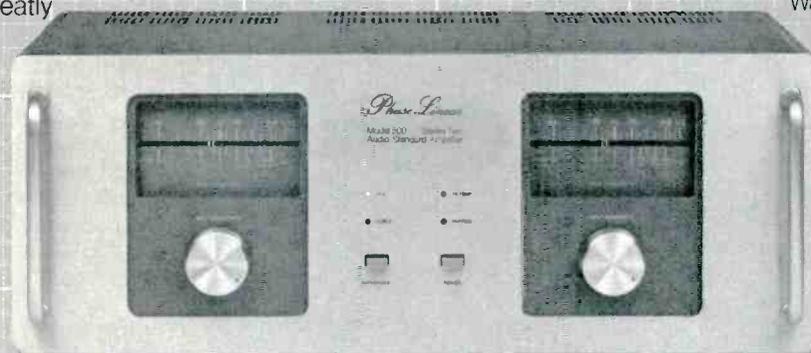
WEIGHT: 65 lbs. (32 kgs.)

DIMENSIONS: 19" x 7" x 15"  
(48.3cm x 17.8cm x 38.1cm)

Optionally available in E.I.A. standard rack  
mount configuration.

Optional accessories: Solid Oak or  
Walnut side panels.

# AGAIN.



Phase Linear Corporation  
20121-48th Avenue West  
Lynnwood, Washington  
98036

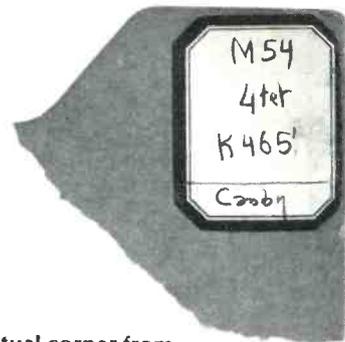
*Phase Linear*<sup>®</sup>  
THE POWERFUL DIFFERENCE

the normal whomp. The speaker was mounted in its own matched box, a correctly tuned bass reflex as I remember, and it was so big it took two or three of us to move it. The woofer was 18 inch (!), and there were two tweeters, the very first I had ever seen. The woofer's electromagnet was as big as a five-gallon pail at something beyond 400 volts. This system was built by an outfit called Federal Telegraph, if memory serves. Telegraph or no, it could blow you right out of a concert hall, even in mono, and I was appointed its boss. Nobody else wanted to touch it. Right then, you see, I discov-

ered the joys of VERY LOUD music, which was some time before you did, I'll bet. Early hi-fi conditioning.

Out of the blue, I was also appointed to the job of setting up those thousands of records for practical use, in a small office at our headquarters. You can imagine it. Dozens of big cartons were delivered, every one filled with carefully interleaved and padded 78 singles, and within minutes we had them spewed all over everything, ever so carefully, in our frantic joy at this unbelievable bonanza. When calm was at last restored, I got to work.

Yes, there was some sort of cata-



**Actual corner from Mozart's Quartet No. 19 in C shows Canby's "duidecimal" listing.**

logue but my boss Professor didn't like catalogues and card files. He wanted to toddle right in there five minutes before he avidly gave his famous and often repeated lecture on the Schubert *Unfinished Symphony*, before 200 not-so-avid freshmen, and go right to the shelves to find the records in a hurry. Without looking up a lot of unmemorable numbers on cards. Isn't that exactly the way you feel today?

So what to do? I gave my soul to those records for months, and in the end I came up with a System which really worked, all things considered. No cards!

Just the records themselves. And labels. A gummed label was "affixed," as they say, on the upper right-hand corner of every green manila folder (equivalent to the modern LP record jacket). On the label went a code, a bold, brief, easily read code which was my big idea. With a bit of practice, you could read it right off in words, the composer, the type of music and the name of the piece. Being a classical collection, we filed under *Composer* — but the system would work out just as well in other areas with, say, the performer or the title on top. Musical shows by title. Jazz, rock/pop by performer or group or album. Take your choice.

### The Long & Short of It

The necessity for any such code is that it be understandable, brief, and very visible to the roving eye. No searching, no eye strain! Thus you need uniformity, especially in the size aspect. Short composers, like Cesar Cui, or long composers, Mario Castelnuovo-Tedesco, must be equally visible. And the same for categories; make 'em brief. But quickly intelligible. That came first of all. It was a challenge.

Now somebody had told me about a thing called duidecimal or something, which was used for records at Vassar College. Innocent me, I did not know that a billion library books were, and are, filed by the ingenious Dewey decimal system, which uses decimals to

24

U.S.A. **Martin** presents the **TRANSFLEX** SYSTEM PAT. APPLIED FOR

**It may be the ultimate listening machine.**

Through the use of new techniques in transmission line loading, Martin engineers have developed a new series of loudspeakers with such startling bass response that enclosure patents have been applied for in seven countries. The TRANSFLEX provides extremely wide linear bandwidth, exceptional transient response and expanded polar distribution — creating a perfection in sound previously unattainable. We will be supplying audio stores with the Martin TRANSFLEX as quickly as we can craft them. Go experience the TRANSFLEX. And get yours!

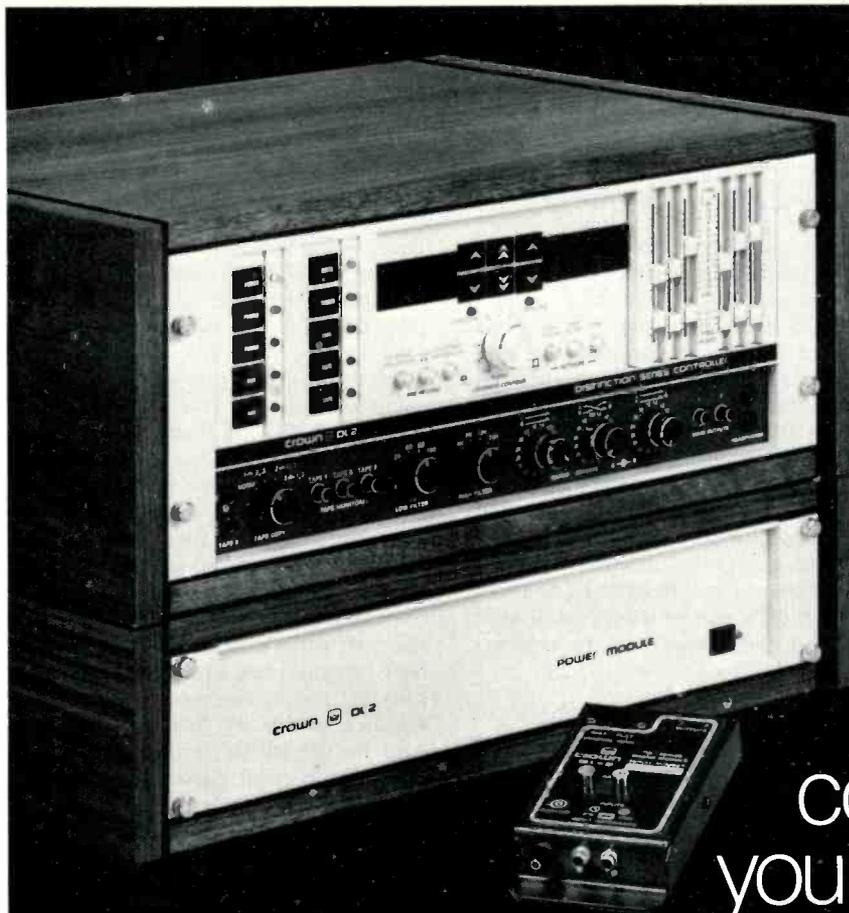
**The sound of perfection**

4 models • From \$450 to \$1,300 the pair.

MARTIN SPEAKER DIVISION, Eastman Sound Manufacturing Company, Inc., Mickleton, NJ 08056 • 609/423-0100

Enter No. 19 on Reader Service Card

AUDIO • December 1978



# Does it make sense to buy a new audio component you can't hear?

You bet it does. Especially if you care about absolutely accurate reproduction of recorded sound.

The new Crown DL-2 Distinction Series Controller is close to being the perfect pre-amplifier. It controls the signal level but changes nothing else unless you want it to.

The DL-2's sonic excellence is impeccable. New, patent-pending circuitry and no-compromise, common-sense design have resulted in outstanding specifications. Signal-to-noise ratio is better than 97dB unweighted. Frequency response  $\pm 0.2$ dB, 3Hz to 100KHz. THD, IMD and TIM are simply not audible.

One of the reasons you can't hear the DL-2 is that it is three components.

The revolutionary phono preamp mounts next to the turntable. That eliminates most RFI problems. But it also in-

cludes wholly new circuit concepts for unmatched sonic performance, and new convenience in hook-up.

The separate power supply keeps AC line noise completely out of the signal path.

The control module sets a new standard of control freedom. Leave all controls flat for accurate reproduction of input. Or adjust the sophisticated, equalizer-type tone controls to your taste. Select one of ten built-in ISO compensation curves. Control your choice of external processor. Unbelievably accurate digital control of level and balance. A new concept in stereo imaging.

To believe the sonic excellence of the Crown Distinction DL-2 Controller, you'll have to try to hear it. At your dealer. Soon.

Write for free brochure on the DL-2. It, too, makes sense.

 **crown**

1718 W. Mishawaka Road, Elkhart, Indiana 46514

*American innovation and technology...since 1951.*

## We build a speaker that sounds like music

It can accurately reproduce the 120+ dB peaks that are found in some live music. That's more than just being able to play music loud. It can accurately reproduce the music bandwidth—from below 25Hz to 20kHz. And the Interface:D's vented midrange speaker reproduces midrange sounds with the clarity and purity that allows precise localization of sound sources—both lateral and front-to-back.

The Interface:D is the only commercially available speaker we know of that can meet these criteria. Audition them at your Interface dealer.



**Electro-Voice®**  
a gulton company  
600 Cecil Street  
Buchanan, Michigan 49107

# Interface:D™



subdivide numerical categories ad inf. Say, two books are listed as 795.1 and 795.2 and you have a third that must go in between; it's easy. 795.15. You can get into the millis and the micros if need be — 795.16483. I had a better idea, for us. Forget the numbers but borrow that decimal subdividing. And use numbers, with decimals, to indicate alphabet letter order.

What I did was to combine the idea of "instant" abbreviations, for the composers, the categories of music, and the specific titles, with the decimal thing, which I used for the composer. Not his name, but his initial, followed by a number, from 1 to 100, treated as alphabet. How's that? On the shelves, Old Johann Sebastian Bach appeared as a bold *B 15*, Beethoven as *B 55*, a sort of early zip or area code and even more easy to remember.

We gave the round numbers, so to speak, to the big guys, the famous composers, and put the others in between. The above mentioned Cui, for instance, might have been *C 96* and his long-named mate, Castelnuovo-Tedesco *C 18*. Same length. Any old number would do just so it was approximately in the right alphabetical area. In a very short time you got to remember these "zip" names and if not, there was a handy list right next to the records. If I miscalculated my numerical space, I just added decimals a' la Dewey. If J.S. Bach was *B 15*, his youngest son Johann Christian Bach might be *B 14* and if, by chance, their first cousin (?) Johann Bernard Bach suddenly turned up, he would get to be *B 13.5*. My Professor was pleased as all get-out. Just what he wanted, and no cards to bother with.

On a second line of symbols, put below the first, I placed the musical category. Much easier to read *below* than beside. Same idea, though no great need for decimals. Abbreviations, in caps, instantly interpretable. Symphony, of course, was *SYM*. Sonata was *SON*. Concerto was *C*. If you were looking for a Bach *Passacaglia*, you would find it under *PASS*. And to qualify these categories, we put a prefix in lower case, also instant-style. File accordingly. Piano Concerto came out *pf C*. Violin Sonata *vi SON*. How could you go wrong? Standard musical abbreviations, those. Even to *fag* which, in case you are unclear, refers to a bassoon (faggot). There were complications, of course. There always are. But let them pass; in general our music fitted the system neatly, and so will yours if you will make yourself a similar personal code.

Finally, the third line on the label, below the other two, was the specific title, also abbreviated to taste. Mostly a number, #1 or Op. 44, but sometimes a name. Or a combination, to be sure the piece got in the right place. Thus — the Schubert *Unfinished Symphony*, which is #7, would appear as *S 40* (top line, bold characters) *SYM* (second line) and on the bottom, #7 *Unf*. Read it right off. Only, in those days there were numerous discs for each work — so you would see #7 *Unf, 1* and #7 *Unf, 2* and #7 *Unf, 3* for the three records of the set. Mostly today it's the other way; we have two or a dozen works on a single disc, which is a problem. Get to that in a moment.

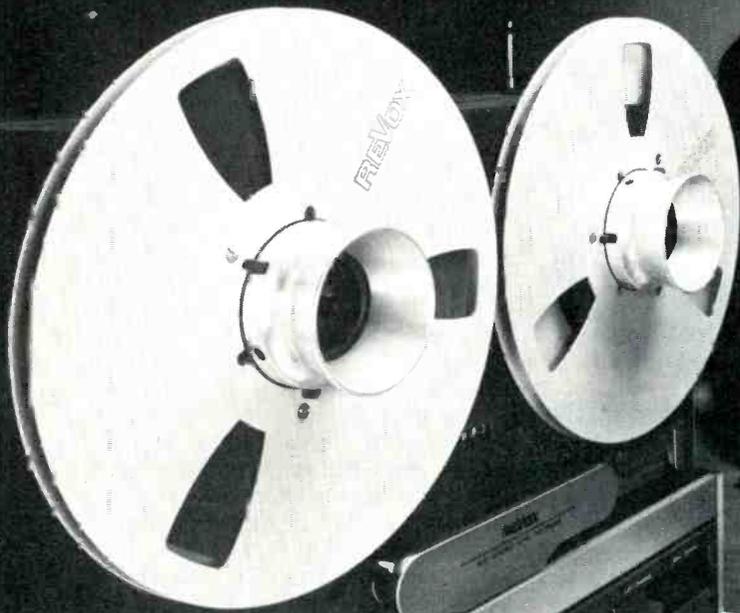
So my Professor could walk in on a Monday morning, go straight to the shelves under Schubert, which is to say *S 40*, riffle along to *SYM*, the Schubert Symphonies, and with one hand pull out the three records for the *Unfinished* under #7 *Unf*, all in a jiffy. And be off to his lecture. (Naturally, when the records came back, I had to put them away.) You can see how visible these labels were if you print out with a good felt pen that *S 40* in characters about a half-inch high, then below that the *SYM*, slightly smaller, and the #7 *Unf*, smallish but still legible at a good distance. Good for the eyes.

### Dups, X-es, and Abbvs.

Hey (you say), how about duplications, different performances? Well, in the Thirties there wasn't much problem; we were lucky enough to get even one version of each major work. In that early electrical era the record companies were much too busy tackling all that music still unrecorded. Today is different, and maybe you'll want a separate symbol, to cope. By performer, perhaps, or conductor. How about *Tosc* and *BWalt* for the Toscanini and Bruno Walter versions of the same music? Awful? OK, make up your own. Fortunately, musical names tend to be shorter these days. *cDavis* and *aDavis* for the two British conductors, Colin Davis and Andrew Davis. Or use the record company, say the RCA and the London recordings. Anything that reminds you of what you own. You can even subdivide, for those determined artists who do the same piece over and over. *VonK 1* and *VonK 2* — that's Von Karajan.

Cross filing is a real problem, with more than one significant piece on a single record. In jazz it might be Bessie Smith (*BSmith*) on one side and Louis Armstrong (*LArms*) on the other; in classical, you might have the Beethoven *Fifth Symphony* on side 1 and the

# real to reel...



## sounds best on ReVox B77

Real to reel means live performance recording, and that's where the ReVox B77 dramatically demonstrates its superiority over other tape recorders. Only the B77 has the wide dynamic range and generous record headroom you need to capture without compromise the full detail and dimension of live music.

Only the B77 delivers the "ruler-flat" frequency response you get from Willi Studer's legendary head design. Only the B77 combines the convenience of push-button digital logic control of tape motion, professional VU meters with built-in peak level indicators, and a self-contained tape cutter/splicer.

If you're thinking of upgrading your real to reel performance, try the ReVox B77. It's available in half or quarter track,  $3\frac{3}{4}$ - $7\frac{1}{2}$  or  $7\frac{1}{2}$ -15 IPS. For complete information and list of demonstrating dealers, circle reader service number or contact us at the address shown below.

# REVOX

Studer Revox America, Inc., 1819 Broadway, Nashville, Tennessee 37203 / (615) 329-9576 • In Canada: Studer Revox Canada, Ltd.  
Enter No. 59 on Reader Service Card

# PRIMO MICROPHONES & HEADPHONES



CMU-503

EMU-4520

## Live recording use

CMU-503 is a condenser microphone specifically developed for multi-purpose sound collection. The preamp section employs stringently selected FET and a unique circuit design to achieve an inherent noise of 20dB and maximum input of 140dB so that it can be used confidently from OFF to ON.

EMU-4520 is a professional use high quality electret condenser microphone. Since it has the same excellent tonal quality as professional condenser microphones used in broadcast stations, it is ideal for loudspeaker use, hi-fi recording and other audiophile sound collection applications.

Power supply for Model CMU-503

High quality dynamic stereo open air headphone DH-1026



Dynamic stereo open air headphone DH-1025



For further information, please contact to:  
**PRIMO MICROPHONES, INC.**  
 2468 DELTA LANE, ELK GROVE VILLAGE,  
 ILLINOIS 60007, U.S.A.  
 TEL: 312-595-1022 TELEX: 28-3474 PRIMO MUS ELGR

**PRIMO COMPANY LIMITED**  
 6-25-1, MURE, MITAKA-SHI, TOKYO, JAPAN  
 TEL: 0422-43-3121~9 TELEX: 2822-326 PRIMO J

Enter No. 48 on Reader Service Card

## Move Your Old Equipment Fast In Audio's Classified Section

28

### SO WHERE'S THE GUITAR PLAYER?

He vanished right in the middle of a riff. Eliminated by a low definition cartridge. But ADC could have saved him. The XLM Mk III features the famous ADC tapered cantilever, which when combined with our tiny .004" x .008" rectangular nude diamond results in 50% less mass.

That's less than our previous lowest mass cartridge, the highly acclaimed XLM Mk II. And because of its ultra linear frequency response, 10Hz, to 20kHz  $\pm 1$ dB, every instrument sounds alive and natural, all at a record saving tracking force of .34 to 1.2 grams.

So be good to guitar players and other musicians. Invest in something that understands them, and protects them. An ADC cartridge.

Audio Dynamics Corp., Pickett District Rd., New Milford, CN 06776 • Distributed in Canada by BSR (Canada) Ltd. Rexdale, Ont.  
 Please circle our reader service number and we'll send you a free record care gift.

Enter No. 1 on Reader Service Card

Schubert *Unfinished* on Side 2. You can't split the disc down the middle and file each in its right place. One wary answer, still without file cards, useful with extreme moderation, is the record dummy. But don't go too far.

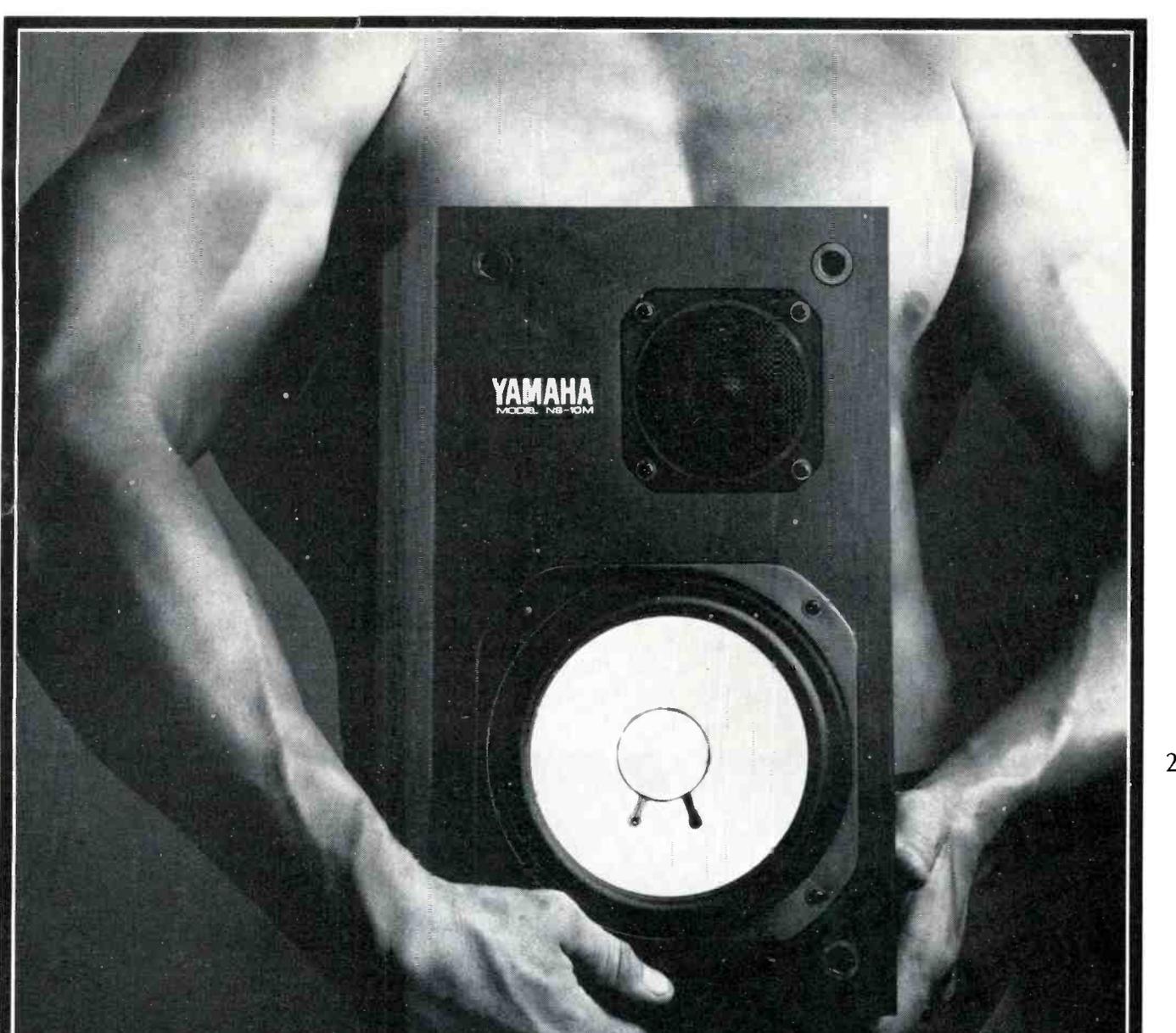
You cut cardboard squares the size of an LP (or a tape), or collect some of those rigid board squares they use for record shipping. Put your usable label on the record itself for the main item, side 1, in this case the Beethoven, *B 55 SYM 5*. Then take one of the cardboards and put a label on it, in the usual place, for the Schubert, just as though this were a real record. Now, *directly underneath* The Schubert label put another, very visible, with the Beethoven information on it, exactly like the label on the real record. Instant cross reference! File the dummy disc right among the S records, like a real record. It tells you that (a) you do own the Schubert *Unfinished* but (b) it is on the back of the Beethoven (which you might have forgotten); so go find it there.

Use dummies only for recordings you really feel are favorites. Otherwise you'll be making more dummies than you have disc or tapes — say all 16 items on an LP pop record. Quick way to go nuts.

So there it is. I am aware that this three-or four-symbol label system, devised for a very big classical collection, sounds dreadfully complicated for your modest library, which isn't that big (nor are you that ambitious). I hasten to repeat that the details are yours to invent, and you can be much less fancy and still profit. What really counts here is first — no cards. And second — a label code that is uniform, brief, and immediately readable right on the record. Not a batch of meaningless numbers that have to be looked up, before you can find anything. Short of a complete professional-type card file system, this is surely the best way for most of us to make a beginning, and it can be amusing and pleasant too. Use your abbreviational ingenuity! Go to town.

Yeah, man (Yessir), listen to those jazz greats, not only BSmith and LArms but old FatsW himself and the ever enduring BGood. You know 'em all, don't you, and you can find 'em too. And take the musical show! The old ones, like "Naughty Marietta" turn up NMar; "The Student Prince" would obviously be StudP, a stud all right. You can even get help from the P.O., which has the right idea. "Oklahoma!" OK! When they get to a musical on my state, "Connecticut!" the label will be just as brief and just as memorable—CT!

AUDIO • December 1978



## Incredibly smooth, well-defined, powerful. Yet small.

Presenting Yamaha's new NS-10M Mini-Monitor. With wide, even dispersion, high sensitivity, and accuracy, the sound is distinctly Yamaha: a rich, solid sound with a tight, firm bass that respects every nuance of tonal shading.

What you're going to wonder, is where it's all coming from. Because for the sound, the Mini-Monitor is amazingly small. Weighing in at 13 lbs., the speaker measures only 4.4" high, 8.5" wide. Inside, a 7" cone woofer and a 1.5" dome tweeter produce 90 dB SPL with 1 watt at 1 meter.

The Mini-Monitor was made in the image of the NS-1000. It has an identical finish, and like its bigger brother, is sold in mirror-image matched pairs. At low volume levels the sound is virtually the same. It's a primary monitor with the NS-1000 look and sound, for places the NS-1000 won't fit.

Our new Mini-Monitor with the powerhouse sound is currently contending with the heavyweights at your Yamaha Audio Specialty Dealer. And holding its own, thank you.



# YAMAHA

Audio Division, P.O. Box 6600, Buena Park, CA 90622

If you can't find your nearest Yamaha Audio Specialty Dealer in the Yellow Pages just drop us a line.

# Behind the scenes

Recently I was visiting a friend who is an avid photography buff, and he was proudly showing me a new telephoto lens for his 35mm SLR. The lens he was showing me was merely the 14th addition to his optical armamentarium, along with countless other photographic gizmos and doohickeys that he feels are a prerequisite for the compleat photographer. The fact that he is a lousy photographer, with virtually no sense of composition and perspective, is purely coincidental.

I was struck by the similarities between this camera buff, and many audiophiles who become so immersed in the "nuts and bolts" of audio technology that they lose sight of the original objectives for all their expenditure of time, energy, and money: To wit, to come as close as they can in creating

an illusion of reality, a simulation of the concert hall listening experience which will enhance their appreciation and enjoyment of music. I will be the first to admit to the fascinations of audio equipment, to new ideas and techniques. Quite obviously, audio technology is a major concern in my monthly column. I readily agree there is nothing quite like the thrill of anticipation when you are hooking up a new phono cartridge, amplifier, or loudspeaker, anxious to hear if the device will transport you to some audio *nirvana*. While one can appreciate the complexities of the device and admire its construction and quality, the important thing is its application and contribution to the improvement of your sound. Technology should, indeed, be the handmaiden of music.

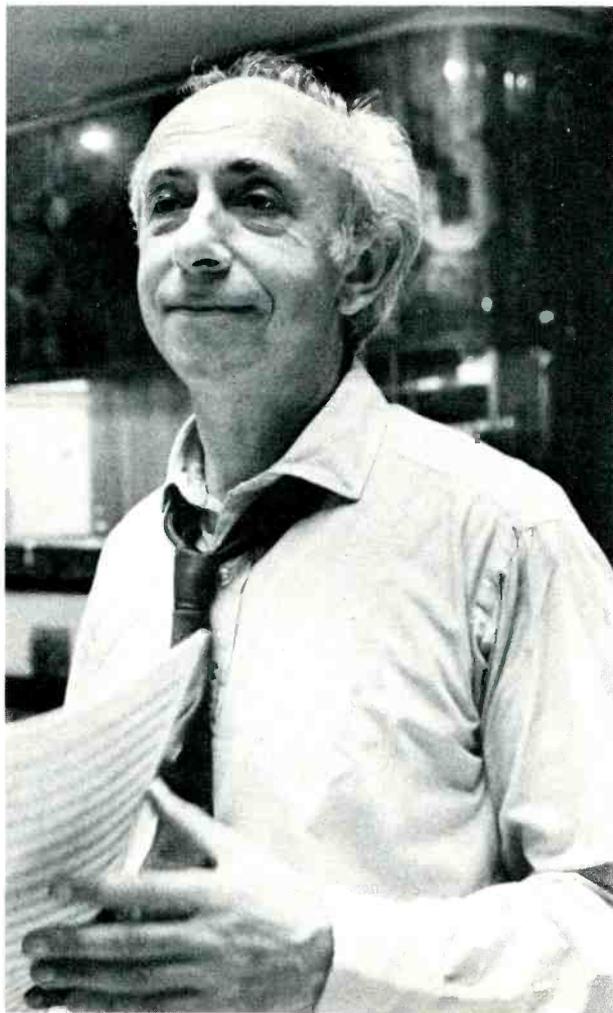
If the pursuit, or "hobby" if you will, of audio is mainly concerned with the reproduction of music, I have had the good fortune of being involved in the recording of music. Over the years, I have had the privilege of knowing and working with many famous music personalities and conductors. This association has led to some interesting situations, and life certainly hasn't been dull!

## Composer Conducting

I do not have the presumption to state that I maintained a salon, nonetheless, I have entertained many people who have distinguished themselves in the arts and sciences. One of my recent guests was Morton Gould, the American composer and conductor. I had recorded his well-known *American Salute* with the Eastman-Rochester Symphonic Wind Ensemble, and he wanted to hear how it sounded. Morton, in his professional life, has heard his own and other's music through studio monitor set-ups many times. However, in my home he was exposed to an ultra high quality audio system for the first time. I played the master tape on the Ampex, and when he heard the pristinely clean woodwinds, the massive brass sonority, and the impact and weight of the percussion in this splendid orchestration, he was mightily impressed.

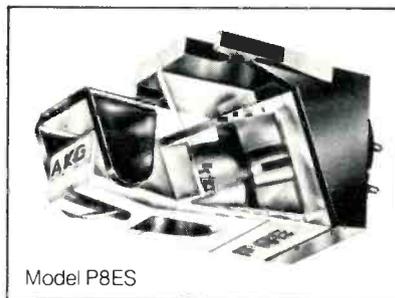
As is usual in these kinds of sessions, we talked about orchestras and conductors and music, and, of course, exchanged anecdotes and jokes about them. He liked one of my Sir Thomas Beecham jokes, which I'll pass on to you . . . Not long after the War, 1949 I believe, Sir Thomas was on an American tour with his Royal Philharmonic Orchestra, and in addition to playing in such obvious cities as New York, Chicago, etc., they had been booked into Joplin, Missouri . . . later distinguished as the home of baseball hero Mickey Mantle. This was a major social event, of course, and after the concert there was the usual reception in the Green Room (Don't ask me how it got started, but in every concert hall the world over, even if the reception room should be bright red or purple or whatever, it is always called the "Green Room.") One of the local

Morton Gould



**Sooner or later  
one of the remarkable  
AKG TS\* Phonocartridges  
will end your search  
for the pick-up system  
that most perfectly  
re-creates the sound  
your recordings were  
originally made from.**

31



Model P8ES

**Why put it off?  
Hear one at your dealer today.**

The following AKG Phonocartridges  
are available to meet a range of budgets  
and sound systems

Models: P8ES, P8E, P7E, P6E and P6R.



*The Mark of  
Professional Quality...  
in microphones, headphones,  
phonocartridges, reverb units.*

\*Transversal Suspension System  
U.S. Patent No. 4054758

**PHILIPS AUDIO VIDEO SYSTEMS CORP.**  
A NORTH AMERICAN PHILIPS COMPANY  
91 McKee Drive, Mahwah, N.J. 07430 • (201) 529-3800

matrons, "dressed to the nines," came up to Sir Thomas, bubbling with enthusiasm, and said, "Oh, Sir Thomas! How did you like our Joplin audience?" In his inimitable British accent he replied, "I don't know, Madam, my back was turned!" (My apologies to the good people of Joplin for this.)

One of the things I was discussing with Morton was our forthcoming recording with the London Philharmonic Orchestra, with him conducting his famous *Spirituals for Orchestra* (which I had recorded for Everest 20 years ago with the LSO and Walter Susskind) and the first modern recording of his *Stephen Foster Gallery*.

During our conversation, I mentioned to Morton that one of my impending recording projects was to have Carlos Chavez conduct his audiophile favorite *Toccat for Percussion* and some other of his smaller scale works. Morton said that it just so happened that he was going to Mexico the following week to conduct some of his works with the Orquesta Nacional de Mexico. Sad to relate, during his engagement there, Carlos Chavez died at the age of 74. Morton told me that he had written an *Elegy* to conclude his score for the TV special, "The Holocaust," but it was never used. When news of Carlos' death reached Morton in Mexico City, the next day at his concert he announced from the podium that he was dedicating a performance of this *Elegy* to Carlos Chavez. Carlos was a good friend of Morton Gould and Aaron Copland and a composer much admired and respected in the music world. I had the privilege of knowing him and recording him with the New York Philharmonic, playing his *Sinfonia India*, *Sinfonia Antígona*, and the world premiere recording of his *Sinfonia Romantica*. That recording took place during the summer in Manhattan Center, and with no air-conditioning the place was stifling. Carlos was a rather short, stocky man, and was obviously becoming very uncomfortable. Finally, he stopped the recording, stripped to the waist, and with his rather hirsute bull chest glistening with sweat, we continued!

### Recording Retiree

I visited London recently to make arrangements for the recording of the London Philharmonic I mentioned earlier, and I had quite a talk with the genial long-time manager of the LPO, Eric Bravington, who quite rightly, has been awarded the Order of the British Empire for his services to music in Eng-

land. The LPO is a superb orchestra these days, as well they might be with Bernard Haitink as principal conductor and Sir Georg Solti as principal guest conductor. The venerable Sir Adrian Boult is President of the LPO. Now 89, Sir Adrian no longer conducts concerts but, like Stokowski in his later years, is still active in recording. In fact, I had wanted to record Sir Adrian doing Holst's *The Planets*, a work he virtually "owns," and was quite disappointed to learn that he had recorded it for EMI a few months ago. He has recently recorded the Beethoven "*Pastorale*" *Symphony*, and it has fared very well in the hands of the critics. I vividly remember my last recording session with Sir Adrian and the London Philharmonic in 1959. We were going to do the world premiere recording of Ralph Vaughan Williams, *Symphony #9*, and the composer was to have attended the recording session. That morning Sir Adrian met me in the Green Room which was (and still is) used as a control room at the Walthamstow Town Hall recording locale. He said, "Oh, Mr. Whyte! As you know, Ralph Vaughan Williams was to have been on the recording session with us today, but he died four hours ago." The orchestra did not yet know about this, and if you should run across my Everest recording of this work, you'll actually hear Sir Adrian announcing this news to the orchestra, and saying . . . "and thanks to our American friends for making it possible to record this great work."

While in London, I visited with conductor Walter Susskind in his dressing room at the Royal Albert Hall. He had just finished rehearsing the BBC Symphony Orchestra for one of the annual Sir Henry Woods "Prom" concerts. Walter is a much underrated conductor who turned the St. Louis Symphony into a first-class ensemble in his seven years as conductor and music director there. He took over as conductor of the Cincinnati Symphony this year, after the tragic death of Thomas Schippers, and will preside over the podium there next year as well. About a year ago, the New York Times carried a most laudatory article about the talents of Walter Susskind and particularly cited him as "an orchestra-builder in the tradition of Stokowski." I am to record Walter with the LPO, just before the Morton Gould sessions. Walter offered me a lift back to my hotel, and as we walked out of the Royal Albert Hotel, the sidewalks around the circumference of the Hall were jammed with several hundred young people, who had been waiting

# Mitsubishi Car Audio Dealers

- |   |  |
|---|--|
| <b>CALIFORNIA</b><br>DOW SOUND CITY CAR STEREO<br>San Diego<br>THE FEDERATED GROUP<br>West Los Angeles<br>Hollywood<br>Westminster<br>Canoga Park<br>La Puente<br>SAN JOSE STEREO TAPE<br>San Jose<br>SOUND COMPANY<br>San Diego  | <b>KENTUCKY</b><br>AUDIO WAREHOUSE INC.<br>Louisville<br><b>MASSACHUSETTS</b><br>K & L SOUND SERVICE CO.<br>Watertown<br><b>MINNESOTA</b><br>DAYTON S<br>Minneapolis<br>MR. MUSIC MAN<br>Moorhead<br><b>MISSOURI</b><br>INDEPENDENCE AUDIO<br>Independence   |
| <b>CONNECTICUT</b><br>PJ'S INC.<br>East Hartford<br><b>FLORIDA</b><br>AUDIO GARAGE, INC.<br>Winter Park<br>CONSUMER WAREHOUSE<br>Jacksonville<br>LUSKINS HIGH FIDELITY<br>Hollywood<br><b>GEORGIA</b><br>BACK DOOR STEREO, INC.<br>Atlanta  | <b>NEW JERSEY</b><br>ARMANDS SOUND ODYSSEY<br>Cherry Hill<br>AUDIO DISCOUNT WHSE. SALES<br>West Long Branch<br>SOUNDWORKS<br>Greenbrook<br><b>NEW YORK</b><br>CLASSIC CAR STEREO<br>Great Neck   |
| <b>ILLINOIS</b><br>AUTO SOUND<br>Skokie<br>CAR HI FI<br>Downers Grove<br>CONTROLS UNLIMITED<br>Arlington Hts<br>CUSTOM CAR STEREO<br>Oak Lawn<br>THE STEREO SYSTEMS CO.<br>Aurora<br>UNITED AUDIO CTRS., INC.<br>Chicago<br><b>INDIANA</b><br>HI FI BUYS<br>Indianapolis<br>HIGH FIDELITY<br>Indianapolis | <b>NORTH CAROLINA</b><br>CAR STEREO DISTRIBUTORS<br>Raleigh<br>SOUND HAUS<br>Durham<br><b>OHIO</b><br>THE SOUND CONNECTION<br>Canton<br><b>PENNSYLVANIA</b><br>TEPPER AUTO SOUND<br>Philadelphia<br><b>TENNESSEE</b><br>AUDITION<br>Kingsport<br><b>TEXAS</b><br>B & M ELECTRONICS, INC.<br>Houston<br><b>UTAH</b><br>INKLEYS<br>Salt Lake City<br>ZCM<br>Salt Lake City<br><b>WISCONSIN</b><br>AUTO RADIO STATION<br>Madison<br>SOUND GALLERY<br>Racine |
| <b>IOWA</b><br>AUDIO ODYSSEY<br>Davenport<br>ZUBER'S SOUND AROUND<br>Cedar Rapids<br><b>KANSAS</b><br>AUDIO SYSTEMS<br>Wichita<br>CUSTOM SOUND, INC.<br>Wichita<br>HAYES SIGHT & SOUND<br>Hutchinson  |  |

 **MITSUBISHI®**  
**CAR AUDIO**  
SOUND US OUT



# Miles Ahead in Car Audio Components

You're aware of Mitsubishi audio component systems for your home as well as the superior quality, performance and design that goes into them. Now Mitsubishi engineers have followed through with that same "separate components" premise, and we now want you to be fully aware of our new component systems for your car.

Start with the CV-21 Power Amplifier and the CJ-20 FM Tuner. Then choose the CX-21 Auto-Reverse Cassette Deck or the CX-20 Cassette Deck. Add up to six speakers including a pair of SX-30 two-way Alumi-Die Cast Enclosed



speakers for a total car audio system worthy of the name Mitsubishi.

Now a word about "specs"... we have always believed in rating our equipment's performance conservatively. Only you benefit from this caution. "Sound us out" before you buy any other car stereo system. You'll be miles ahead with Mitsubishi.

A complete line of components, in-dash/under-dash units and speakers await you at select audio and car audio dealers. Check the list adjacent to this ad for the Mitsubishi Car Audio dealer nearest you.

 **MITSUBISHI<sup>®</sup>**  
**CAR AUDIO**  
**SOUND US OUT**

© 1978 Melco Sales, Inc.

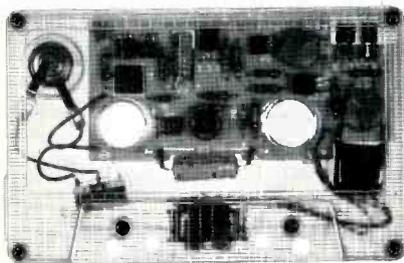
Dealer inquiries invited: Contact Melco Sales, Inc., 7045 N. Ridgeway Ave., Lincolnwood, Ill. 60645, 800-323-4216 (Outside Ill.), 312-973-2000 (Within Ill.)

Enter No. 37 on Reader Service Card

# TDK's new one-second, no-headache demagnetizer.



You don't need time or technical expertise to operate TDK's exclusive instant head demagnetizer. Just pop it into your deck and push "Play" to restore musical performance lost through inevitable head magnetization. Other demagnetizers can be less effective, take more time, or actually magnetize your heads and are more difficult to use. Because our HD-01's miniature battery powers sophisticated circuitry built into a standard cassette shell, it solves all of these problems. You will hear the performance improvement in your home, portable or auto system. TDK Electronics Corp., Garden City, NY 11530.



**TDK**  
The Machine for your Machine.®

since 8 am that morning (we left the Hall at 2 pm) for tickets to the 8 pm "Prom" concert. They take their classical music in England quite seriously!

## London Line-up

The amount of recording done by the London orchestras is quite astonishing. All the "preferred" recording halls are very heavily booked. Walthamstow, where I have done considerable recording, was totally booked by RCA and Philips, through January, 1979. Watford Town Hall, which is still further out from the heart of London, was secured after considerable negotiation and finagling. Watford was much used by Bob Fine in his many Mercury recordings with the London Symphony. Watford and Walthamstow are, in essence, the equivalent of borough halls in New York City. They were never built for the purpose of recording, being general purpose halls used for various community functions. Thus, in Watford and Walthamstow, there are dances, weddings, banquets, etc. The acoustical properties of these

halls which make them so desirable for recording were discovered quite by accident around 1952. I visited Watford to check on all the various facilities and found the hall being set up for wrestling matches! With the control room up a flight of stairs, there is some back-breaking work ahead, as the Walter Susskind/Morton Gould sessions will be the first direct-to-disc recordings made "on location" in England, and getting those heavy cutting lathes up those stairs will be a Herculean task, to say nothing of the Ampex analog recorders, a digital recorder, input console, etc. Old friend Raymond Cooke, the head of the KEF speaker company, is to supply me with monitor speakers, just as he did 20 years ago when he was with Wharfedale. He'll have to wrestle his new Model 105 speakers up those stairs, as well as the special 400 watt per channel Quad amplifiers he is furnishing.

Well, there you have it . . . I thought for a change you might like a little look "behind the scenes" at the world of music and recording. A

34

## Statement of Ownership, Management, and Circulation

(Required by 39 U.S.C. 3685)

1. Title of Publication: AUDIO.
- 1A. Publication No.: 036960.
2. Date of Filing: Sept. 25, 1978.
3. Frequency of Issue: Monthly.
- 3A. No. of Issues Published Annually: 12.
- 3B. Annual Subscription Price: \$12.00.
4. Location of Known Office of Publication: 401 No. Broad St., Philadelphia, Penna. 19108.
5. Location of the Headquarters or General Business Offices of the Publishers: 401 No. Broad St., Philadelphia, Penna. 19108.
6. Names and Complete Addresses of Publisher, Editor, and Managing Editor: Publisher, Jay L. Butler, 401 No. Broad St., Philadelphia, Penna. 19108; Editor, Eugene Pitts III, 401 No. Broad St., Philadelphia, Penna. 19108; Managing Editor, none.
7. Owner: North American Publishing Co., 401 No. Broad St., Philadelphia, Penna. 19108. I.J. Borowsky, 401 No. Broad St., Philadelphia, Penna. 19108.
8. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding One Percent or More of Total Amount of Bonds, Mortgages, or Other Securities: None.
9. For Completion by Nonprofit Organizations Authorized to Mail at Special Rates: Does not apply.

### 10. Nature and Extent of Circulation:

Average No. Copies Each Issue During Preceding 12 Months:	Actual No. Copies Of Single Issue Published Nearest To Filing Date:
A. Total No. Copies Printed: (Net Press Run)	160,880 164,968
B. Paid Circulation:	
1. Sales Through Dealers and Carriers, Street Venders, and Counter Sales:	34,604 40,941
2. Mail Subscriptions:	102,406 94,257
C. Total Paid Circulation:	137,010 135,198
D. Free Distribution by Mail Carrier, or Other Means; Samples, Complimentary and Other Free Copies:	2,702 2,345
E. Total Distribution:	139,712 137,543
F. Copies Not Distributed:	
1. Office Use, Left Over, Unaccounted, Spoiled After Printing:	1,828 3,805
2. Returns From News Agents:	19,340 23,620
G. Total:	160,888 164,968
11. I Certify That the Statements Made By Me Above Are Correct and Complete.	

Jay L. Butler, Publisher

# The A-800: A TEAC with features you can't live without at a price you can live with.

The TEAC A-800 gives you one of the best, most affordable combinations of precision, muscle and good looks around. It's a three head, two motor, dual capstan, solenoid-operated cassette deck that lists for less than \$800.\*

The A-800 transport has a computer heritage... heavy, rock-steady, reliable. The closed-loop dual capstan system isolates the tape between the capstans to provide optimum tape-to-head contact. Result: better frequency response, fewer dropouts. An

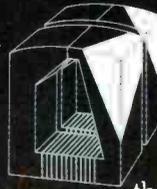


ultra-stable motor drives the capstans while all transport functions are operated through feather-touch solenoid switching both on the deck and with the optional RC-90 Remote Control.

The A-800 uses a combined record/playback head in which both elements are incorporated into a single housing. What's more, the playback head is a unique "Delta" design which incorporates both magnetic and non-magnetic ferrite materials which assures minimum bleedthrough from the record head and eliminates low

frequency contour effects.

In addition to its built-in Dolby, the A-800 also accepts an optional dbx® Type II for wider dynamic range and up to 80 dB S/N. This optional dbx interface—a TEAC exclusive—lets you improve the overall signal-to-noise performance by up to 30 dB. It's got to be heard to be believed!



## TEAC®

First. Because they last.

TEAC Corporation of America  
7733 Telegraph Road  
Montebello, California 90640

\*Manufacturer's suggested retail price.

©dbx is a trademark of dbx, Inc.



Wow & Flutter: 0.05%  
Frequency Response: 30-18,000 Hz  
± 3 dB (CrO<sub>2</sub>/FeCr)

MODEL A-800

LINE OUT

TAPE COUNTER

RECORD

REC MUTE

PAUSE

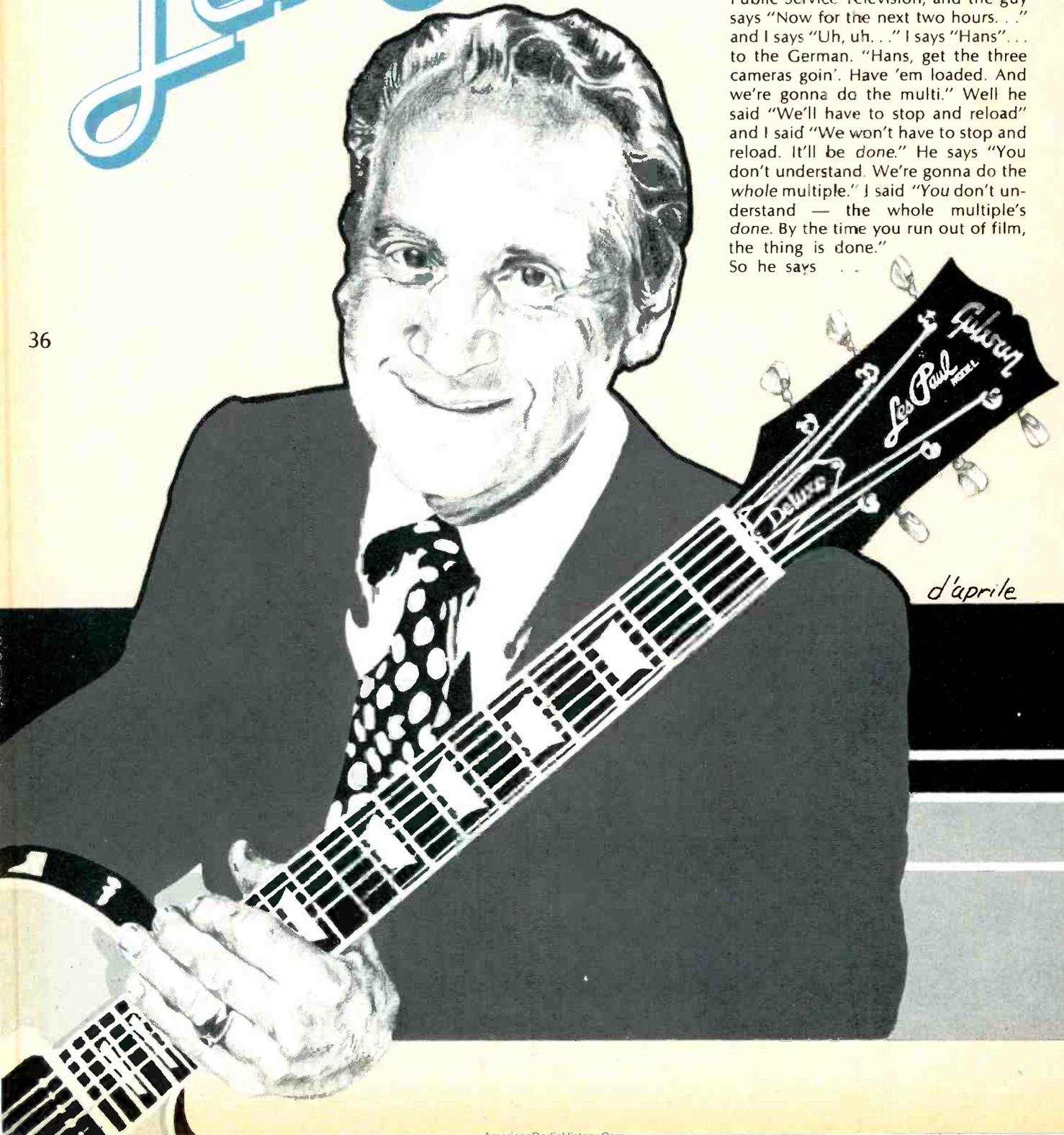
# Interview with Les Paul

Paul Laurence  
and Bob Rypinski

**Paul Laurence:** *First off, how do you approach recording?*

**Les Paul:** You know what? When I make a record, I don't turn any knobs. My engineer sits there and shakes his head. And I'll make a whole record and never touch a knob. No EQ, no echo, no nothin'. Then I'll go to the second part while you wind the tape, lay the second part down, then I do third part, fourth part — the whole number. In 10 minutes! Now here we got three cameras on me, from Germany. For the Armed Forces Radio and TV, and they have these cameras for Public Service Television, and the guy says "Now for the next two hours..." and I says "Uh, uh..." I says "Hans"... to the German. "Hans, get the three cameras goin'. Have 'em loaded. And we're gonna do the multi." Well he said "We'll have to stop and reload" and I said "We won't have to stop and reload. It'll be done." He says "You don't understand. We're gonna do the whole multiple." I said "You don't understand — the whole multiple's done. By the time you run out of film, the thing is done." So he says ...

36



"Well, let's see. Let's see." He spoke pretty good English. So they got the three cameras running . . .

First I asked them what they wanted to hear. He said "Do you know any dirty blues?" I said "I got it down, just as dirty as you wanna get a blues." I said "You want some real funky blues?" So I lay the tracks down there and he's lookin' at this tape whizzin' back and forth and . . . touchin' the button and playin' the parts and the second part and the third part and he sees the bass. . . I haven't laid the guitar down once! Right? The tracks are all filled up and I say "There you are." Then I punch the button and play it back. I don't mix — it's already mixed! No automated mixdown, no nothin', it's mixed! So it went from the 8-track to the 2-track and it's done and I say "There you are." They had a 16-track sittin' there. I didn't even use the 16, I just said "There it is." And they did it all on one take on the film. He's called me from Germany, he's called me from California. . . I guess if he had a chance to get to Alaska he'd call me from there. All he wants to do is redo that. And he says "Slow it down for God's sake. Nobody believes me! They think we chopped it out and edited and everything."

**PL:** "Simulated for television."

**LP:** Yeah, but he says "It went so fast, it's a blur." And I says "This is the way I do it." And it takes 20 minutes to make *Tennessee Waltz* or whatever the song is. Well, what are we foolin' around with? You're layin' a part down, you lay the part down, dum dum dum dum dum, it's down. Rewind the tape, dum dum dum dum dum dum next part. . . He says "You know what you're doin'?" "There it is — it's done."

And the kid today, he's got this flyin' machine, and rightfully so . . . You know, like I said, the producer over there, he's got a board that will drive anybody up a wall. Turn it wide open to get the guy with the money with that glaze in his eyes . . . Well, you know, the biggest crap table in the whole world is in the record business, right? And you get this angel with the money, and you get the Great Pretenders up there, turn 'em wide open (LAUGHTER). And sell, right? Set the clock ahead if he's not lookin'.

But in my department, it's a different world. I just say "I want to get the thing done, I know what I want to do." Then I don't listen to it back. It's on there, I'm done, I never play my records.

**Bob Rypinski:** *There's a question that I'm dying to ask that bears on this subject. When you started with the disc-to-disc-to-disc multitrack. . . I don't really know enough about disc recording to say, but I know that in tape recording when you go from copy to copy, you get a 3-dB degradation each time.*

**LP:** Well, there is modulation on the tape and there's intermodulation and there's harmonic distortion which is associated with the intermodulation . . . And there is the frequency response which is not exactly linear because of head bump, which is at the low end of the audio spectrum, and that head bump is determined by the speed. If it's at 15, you're gonna have a head bump, we'll say, at 50 cycles, and if you go at 7½, it's gonna drop down to one octave below that — 25 cycles — so that head bump has to be removed. And so at a very early age I immediately had to have linear response so that when I did my over-

dubbing, it was linear. Now this applied the same thing to disc, but with *this* machine, if I was ¼ dB off. . . Hell broke over, because I don't wanna be a quarter dB off.

**BR:** *But weren't you degrading each of the early tracks with each track that you added?*

**LP:** 'Course you degrade. But the degrading depends upon what you're degrading. You're at the Hilton Hotel, and you don't know what we're sittin' on down underneath the hotel, do ya? Okay, on my recording we don't know what's down underneath, and the parts that are the least important are the parts I put on first. One of the big secrets of sound-on-sound is that you save your goodies for the last. So if you're going to put somethin' unimportant on, let it be a little worse. Like a drum is in the background, he's just stirrin' around, he's unimportant — put him back there or rhythm guitar. So he's not important, but you get that bass, you gotta have him right up front, and you better have him just right. That lead guitar better shine, and he better be brand new. That vocal better be so clear that the four-part harmony may be off in echo and it may be half a block away. So your perspective has to be in your mind. You have to have this vision.

First of all, it is terribly important that the person sitting on this side of the room is receiving the bass because the bass is the leader of the band. Now, very few people know this, but the leader of the band is the bass. Because you gotta go "boom-ta." Now if you got "ta" and no "boom" . . . you're in trouble. So the leader of the band is the bass note. Now if you're gonna do it with your foot — today's foot player, he's a real happy guy with that foot.

And that foot may be all over the place, and he may be playin' in all kinds of figurations, okay? If he's the leader of the band, then the foot is also the leader, and the bass guitar or standup bass becomes secondary. But as a rule, the bass is the leader of the band, and the "tuck" is secondary. Your tempo is set by "bom bom bom bom" — there's your tempo. That's your tick-tock. So you start with him. So, you want him on one side, then the guy on the other side says "What the hell happened to my rhythm section?" So you put him in the center. I wouldn't think of puttin' the bass on one side, even if there were only two guys, me and a bass. And it was a stereo record with just a bass and a guitar, I would not put the bass on one side.

**PL:** Back in the 4-track days, when people would record the bass and drums on the same track, I would say it, more often than not, was on the side.

**LP:** Yeah, well, they were ping-ponging, they were doing all kinds of things, and they had some toys to work with. I was more interested in getting the sound that was pleasurable. But as far as I'm concerned, I

don't want to sit there and hear a train go by. I never was there and I'm not gonna go there. I'm there to enjoy the music. And I don't care if they get it in mono. I am not a freak that cares whether it's mono, stereo, quad — I don't flip over any of it. You just give me the message. You can play it anywhere — on a Bozo record player, and I'll get the message that he's playin' *I Can't Get Started*. And if a classic is there, I don't care if you play it with a cactus needle. It's got it. And I think a recording is the same way — a good classic recording, if it's good judgment and done well and if the bass deserves to be on the left for a very good reason, then put it on the left. Generally speaking, I'm saying "I don't want to say I want you to sit here, in one spot in a room to enjoy a record." You should sit anywhere in the room and enjoy a record. And I think it's wrong that the wife — who is the biggest obstacle within our course — says "In the house you're not gonna put those two speakers there." And eight tape machines. "Get 'em out of here," right? So you got a constant battle with the lady of the house because she's looking at it from a cosmetic

point. She wants a beautiful room and you want some machinery in it. Well, this machinery's gotta sort of blend in with the thing. When you come into the room, you're liable to plunk anywhere. It don't sound right here, so everybody's crowded over there. So it just doesn't make it. Your sound should sound good anywhere. If you go to our house, when you listen, you can sit anywhere in the control room, and say "man, that's a hit" or "It's great" or whatever's wrong, and you're in perspective, no matter where you're at. This idea that you have to sit on a pinpoint here . . . And not that I don't measure it off with a piece of string, because I do. When I set my speakers up, I put right in the center of that speaker a piece of string, and I bring it to my ear — where I'm gonna sit — and I take a string from that second speaker, it's the same distance.

**BR:** You have an equilateral triangle.

**LP:** You better believe it. By knowing exactly where it is, because now I have to know exactly what is going on. But as far as the guy next to me is concerned, he also has to be happy. So I have my speakers aimed at the client. I want to make sure he's happy, that he's hearing whatever he wants to hear and so forth and so on. So everybody in the room, they're happy. It's the most important part about the control room. When I sell my own records, but when I think of somebody else I always think . . . You know, the client — the angel. I call him "the angel." This is an important man in the record business.

**BR:** Did you emerge from being a performer to a producer after you got your own studio?

**LP:** No. Started out the same day. The same year. I was in electronics at the same time I was in music, and they parallel, and like I said — my mother said "You're gonna be a fireman, and it'll make up your mind what you're gonna be."

**BR:** You said in your bio that when Meredith Willson recruited you for the army, you played with lots of people — now you weren't producing those records?

**LP:** Oh, no, oh, no. If you mean later in life, I worked for Bing Crosby — I didn't produce his show, and I didn't produce in the army. I did produce my own shows in the army, yes.

**BR:** Well, how about that record you made — the *Grand Award* record was it?

**LP:** Chester and Lester?

**BR:** No, no. The one you made with Nat Cole . . .

**LP:** Oh, *Jazz at the Philharmonic*?

**BR:** Did you produce that?

38 Les Paul and Mary Ford in an early Capitol studio.





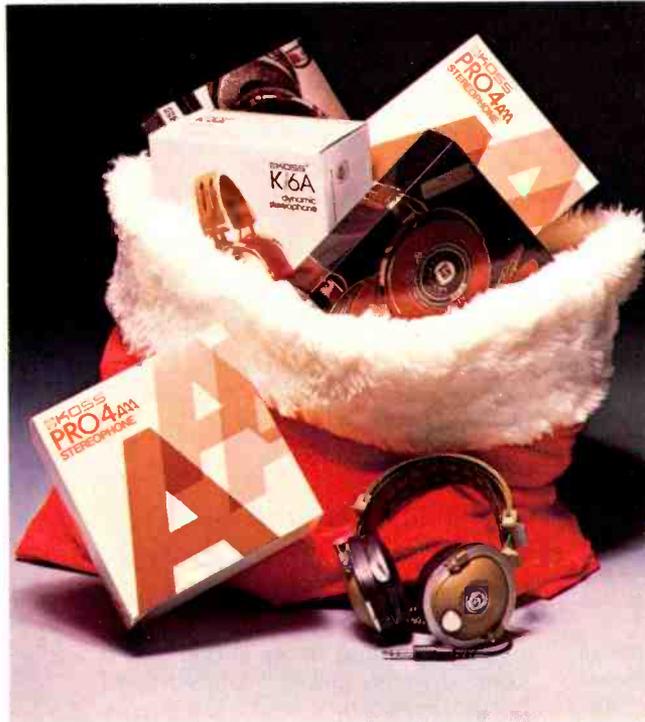
“ More kids wish for Koss stereophones than any other headphone. ”

*Santa Claus  
Audio Expert North Pole*

“ Nearly every letter I receive at the North Pole wishes for Koss stereophones. ”

*May all their wishes come true! And, they can. Because they're wishing for the world's most asked for stereophones. Indeed ever since Koss invented the stereophone, Koss has led the way as the innovator and developer of the state of the art in personal and private listening. Today, that leadership continues as strong and vibrant as ever ... producing a full line of stereophones you truly have to hear to believe.*

“ Fulfilling wishes is never very easy, but the superior quality and diversity of models makes any wish for Koss a



pleasure to fulfill. ”

*We believe in Santa Claus. Don't you?*

“ Of course, I read all the test reports, but never have I read such glowing reports as I have on the Koss Pro/4 Triple A. And when I heard them they really brought a twinkle to my eyes. ”

*The world famous Pro/4 Double A was a tough act to follow but the Pro/4 Triple A's extra*

*large voice coil and oversized diaphragm offer an incredibly beautiful, full-bandwidth, dynamic response over the entire frequency range of 10 Hz to 22 kHz.*

“ The Triple A's are so comfortable and seal out ambient noise so well that even I drift off with visions of sugar plums dancing in my head. ”

*The Triple A's special, human-engineered,*

*direct-contoured Pneumalite® ear cushions create a gentle yet perfect seal for flat, low bass response to below audibility as well as sealing out ambient noise. And the unique Koss dual suspension headband makes wearing the Triple A's as much of a pleasure as listening to them.*

“ Dash away, dash away, dash away all! ”

*Dash away to your audio dealer and ask for a live demonstration of the Sound of Koss. Or write, c/o Santa Claus for our free full-color catalog. We think you'll agree with Santa Claus that when it comes to Koss stereophones and loudspeakers: "hearing is believing."*

© 1978 Koss Corp

**KOSS® stereophones/loudspeakers**  
**hearing is believing™**

KOSS CORPORATION, 4129 N. Port Washington Ave., Milwaukee, Wisconsin 53212 International Headquarters: Milwaukee/facilities: Canada · France · Germany · Ireland · Japan

Enter No. 32 on Reader Service Card

**LP:** No, I didn't produce it. What I did . . . it's a funny story. Oscar Moore was playing guitar with Nat Cole. And Oscar had found a gal that he liked very much and locked himself up in the tower somewhere . . . here in Hollywood . . . and wouldn't come down — they were shovin' food under the door.

**PL:** *Just tortillas.*

**LP:** Yeah, just tortillas — flat food (*Laughter*). So Nat called me and he says "Hey, uh . . . I lost my guitar player." He says "Can you play for me?" and I says "Well, I'm in uniform. I'll have to ask my commanding officer." I says "Can I play a thing for Norman Granz? Jazz thing." Well, they weren't too enthused about jazz but he said "S'long's you wear a uniform, go ahead and do it." We went over, and I'm the only white man in the group that I remember. I don't remember any other one, but maybe there was another one. Anyway, Nat and I are old friends from back in Chicago . . . So are all the rest of 'em. Anyway, we're playing, and again, from a showman's standpoint, I'm interested

around there thinkin' "This is duck soup. We're gonna have a lot of fun and no one's gonna get hurt" — he doesn't know he's goin' to the *killing floor* (*LAUGHTER*). So, it gets tougher, and it gets tougher. And finally I let go with a run that went all the way down that guitar, and all the way up that guitar *and* that I knew God Himself ain't gonna do (*LAUGHTER*). So Nat took his hat off and threw it on the piano, and he just stood up and looked at me, and that was it — the audience went crazy, they threw *their* hats in the air, and that was the climax of that first album, *Jazz at the Philharmonic*.

**BR:** *This was a live performance?*

**LP:** Yeah. Nat threw his arm around me and he says "Les," he says "that's too much." It was all a game, and the game is very simple, that is to just walk the guy out in the rings, you know, and he doesn't even know he's got his gloves on (*LAUGHTER*). And I know I can't play some of the things he can play, but I turn around and play 'em in a position so he's following me and he doesn't know it. And then I say "Well,

out that Western Electric had built theirs in something like 1925 or '26 and that I was only about three years away from *them*. The second surprise that came to me is to find out that the dog didn't invent the phonograph — it was Edison (*LAUGHTER*). I had never heard of Edison, I didn't know anything at all. I knew at a very early age I'm sittin' there lookin' at my mother's phonograph, and I says "Well, if it'll play the record back, why can't I just reverse this thing around and *make* a record?" And I did, and my father, being in the garage business, made me a lead screw, and the first thing you know I had — with my own imagination and no concept at all. I got it from a wood lathe — the whole concept. But as far as knowing what the other guy was doin', I hadn't been out of the woods. I didn't know that Edison existed. I didn't know how they made a record or anything else. I just had to do it on my own. I didn't go to a library or nothing. Made my first record, and when I heard myself come back, my brother said "Big deal." My brother, you know, when he threw a light on, he expected it to light — he didn't know why. I had to know why — I took that switch apart the first day we got electricity (*LAUGHTER*). I got knocked on my rear end but I found out damn quick it was 110. But in 1928, I was well on my way with my first machine, and I heard myself singin' *I'll Be Comin' Around the Mountain*."

**PL:** *Is this a lathe basically? A cutting head?*

**LP:** No, it was a windup phonograph — my mother gave me the handle on a Wednesday. I only got it one day a week.

**PL:** *Are we talking about a cylinder now?*

**LP:** No, it was just a flat disc. We had a Victrola, and you wind it up. Jack Mullin has one. You wind it up, and there it is. I went to Milwaukee and I bought a Western Electric playback and reproduce head, and all I did is make a steel needle for it. I put it in there, and I started cuttin' on some tinfoil. And I tried that thing, then I tried aluminum, and when I found out I could *emboss*, well, I just got a big, heavy lead weight and I put it on there, and I says "Wow, I can *hear* myself. This is great." But *then* I took the head off and played the thing backwards — the same thing. Then I went farther than *that* — I jabbed it in the top of my guitar and I had electric guitar and I says "This is the way to go, I got an electric guitar now."

**PL:** *What year was this?*

**LP:** '28. Same thing.

**PL:** *So you invented the electric guitar?*

---

## "I went to Milwaukee and I bought a Western Electric playback and reproduce head, and all I did is make a steel needle for it."

---

in showmanship. You put a guitar in my hands, and immediately I'm gonna get . . . she's there, I'm gonna get her. And I'm gonna get the one right next to her. I'm gonna go one-by-one, but I'm gonna get 'em. And that audience was just sittin' there, and it's quite passive — it isn't really goin' crazy. So I thought "I'll do my little bit again — I'll throw a hook out." So I threw one of my cheapest runs out. I threw it at *anybody*, but Nat Cole picked it up and played it. I made it dumb enough so that *anybody* could play it, and I got Nat followin' *me*. So I threw a little tougher one at him. And Nat says "Hell, I can play that one" — you know, in his mind. So Nat climbs on my back for a second one. I said "All I gotta do is reel this cat in now (*LAUGHTER*). Got him now." So I made the next one a little tougher. Well, everybody starts gettin' in . . . You know, they're sayin' "What the hell's goin' on *here*? We got somethin' goin'!" So I see this audience lighting up and I says "Now I got 'em *all* on the hook." So Nat doesn't know he's hooked yet. See? He's swimmin'

I got three things in my pocket that I know that this guy, it'd kill him. I'm not gonna kill him until I got everybody in that audience with their eyes poppin' out, and then throw one at him and then just see what happens. If he *possibly* goes anywhere *near* it — which he did. If you listen to the record, he played something *different* than what I play. So I went back and played it *again*, and he went after it a *second* time. So the third time I give him both barrels, and he just took his hat off, threw it on the piano and he did this (*GESTURES*) and threw his arms around me and it just tore the show apart. It was showmanship. Nat was a great man — a great *piano* player, and a great singer, and a great person. I've known Nat from Chicago, and his manager was my manager, so we were closely related all through life.

**PL:** *One thing I'm trying to do is relate the new developments in recording to the records. And I figure you can give me a very good overview there.*

**LP:** Well, I built my recording machine back in the late '20s and then found

# Introducing the home stereo receivers for your car.



**Individual Bass & Treble Controls.**

**Power Amplifier.**  
Separate power amp installs in trunk. Provides up to 60 watts of Total System Power.

**Bi-Amplification.**  
Divides and sends correct frequencies and power levels to respective drivers through four separate amps (two for highs and two for lows).

**Loudness.**  
Recaptures all the bass that can disappear at low volume levels.

**Dolby® Noise Reduction.**  
Processes out tape hiss on Dolby-encoded tapes; improves dynamic range of Dolby-encoded FM broadcasts.

**Muting.**  
Eliminates inter-station noise when changing stations.

## The Jensen Car Stereo Receivers.

At long last... Jensen introduces the Stereo Receiver for your car. Indash.

A series of six stereo receivers: Three with cassette. Three with eight-track. All featuring incredible wide range tape reproduction and monitor quality FM broadcasts with superior sensitivity and pinpoint selectivity.

At the very heart of Jensen's Car Stereo Receivers

can be found four independent, direct coupled amplifier sections—two for each channel. Several models even boast the electronic sophistication of bi-amplification which minimizes distortion and increases peak power levels.

Feather-touch electronic switching puts the receiver through its paces: Dolby Noise Reduction System, Loudness Compensation, Switchable Interstation Muting, Tuner On/Off and Local/Distant reception.

These are some of the features that have created a distinct new category: Car

Stereo Receivers. The same features and quality that have earned these receivers the Jensen name.

For a free full color brochure on the family of six Jensen Car Stereo Receivers, write:

**JENSEN**  
SOUND LABORATORIES

Division of Pemcor, Inc.  
4136 North United Parkway  
Schiller Park, Illinois 60176

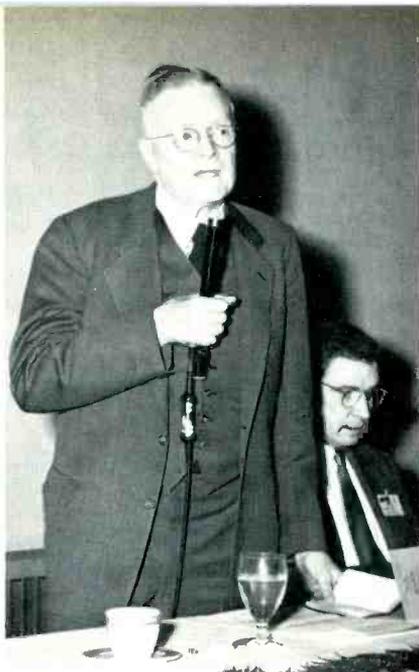
**LP:** Yeah. '27, '28, in the late '20s. By 1930 I was gone, in Chicago already. Here's another one for you. We used to broadcast in Wisconsin, Racine, Kenosha, Milwaukee, and the engineer sat on the floor with a little crystal set, and he'd get that and he'd say "Sounds good," ... had his earphones on and he'd point to you and you'd sing and do your songs. I'd sit on a bed! We were broadcasting from a bedroom! And the amazing part about this thing is that I didn't know any different. Two hours later I was on stage at the Capitol Theater. And I had to do a show. That's the first hook I ever found. I was out on the stage and after a few minutes of me (*MAKES WHISTLING NOISE*), I was off stage (*LAUGHTER*). Yes, sir, I learned at an early age, I better learn to be a showman. I was a dead duck. I didn't last long at all.

**BR:** Was it amateur night?

**LP:** No, it wasn't amateur night — I just was at the Capitol Theater in Racine and I got the hook. And I says "Well, I'll have to learn" so I got a wig and I started doin' comedy. And by 1930 I was well on my way to doin' burlesque shows and country shows and so forth and so on.

**BR:** As *Red Rhubarb*, were you a comic character?

**LP:** Yes. Played the harmonica and the guitar and I sang funny songs and serious songs and ... Well, I was one of the biggest in Chicago if not *the*. Well, the biggest ended up Gene Autry, but in Chicago I had a tremendous following, and in about 1933 at the World's Fair I decided to *drop* playing the guitar and become a piano player. Because by then I was a pretty good piano player. And in 1934 Art Tatum came along. And I go down to The 3 Deuces and I heard Art Tatum and I said "Well, that ends that (*LAUGHTER*). There's no sense in me even *lookin'* at a piano." So the piano went to the side, and I went back to the guitar. But *that* was my first machine. The second machine I built was in Chicago. I remember building this lathe myself and finding that the turntable had to be balanced — dynamically balanced — and so I used plaster of

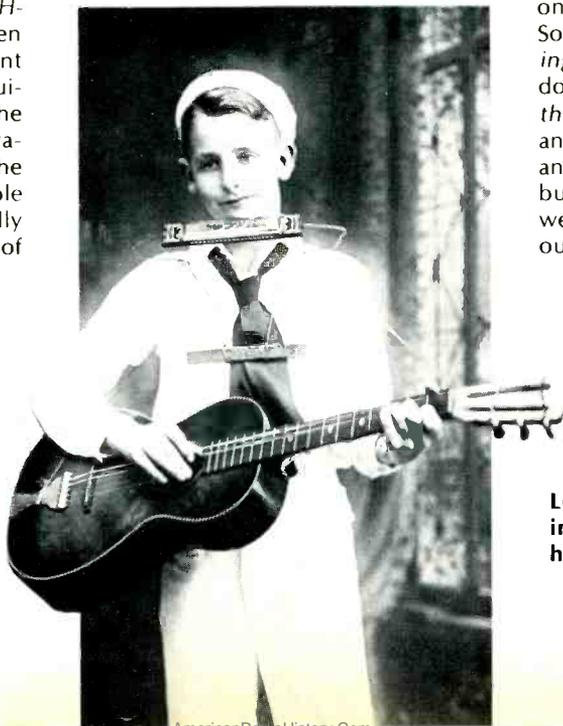


**Col. Dick Ranger, flanked by F. Sumner Hall, at an early meeting of the AES.**

Paris underneath the table. I patched it up with plaster and I got it so that it was evenly balanced. It was a rim-drive. No overhead feed-screw, like a Green Flyer which was in there too. I had a Green Flyer for the second machine. And so I had two machines, and I was doing my multiples then. But never knowing that there were commercial machines.

**PL:** When did tape happen? Late '40s? 1947?

**LP:** The tape I heard by Col. Ranger in Newark, New Jersey, back in probably '45 or '46 — it was in that era. It was right when he came back from the war. And I happened to be workin' with Judy Garland and Paul Whiteman. And then Col. Ranger called me and asked me if I wanted to hear a



**Les Paul, at age 11, in Waukesha, Wisc. Already his ability was evident.**

tape machine. And I said "Is it anything like a wire machine?" He says "Yeah, but the wire is turned. This is flat paper tape and I brought it back from Germany." From Luxembourg or wherever he was. He brought it back in pieces and put it together in Newark. I went over there, and I heard it. I went back to California and I told everybody in California. I said "Man, Dick Ranger's got a thing that you won't believe." I'd known Jack Mullin, and Jack says "I got one in my garage. I haven't put it together yet but I got one in my garage." Col. Ranger was a lousy businessman ... and he worked for me, I hired him. So Col. Ranger worked for me for four years. In all our filming. Television in my home. But Col. Ranger being a bad businessman, Jack Mullin was a *good* businessman. He wasn't much better than *me*, because he gave the idea — I presume he gave the idea — to have Ampex ... He walked up to this Murdamood or whatever their name was ... up in San Carlos

**BR:** Alex M. Poniatoff. He was building the electric motor.

**LP:** That's right! Exactly! Alex is a very dear friend of mine. And he gave 'em the ...

**BR:** Well, I don't think Jack felt that he owned it, he just copped it from the Germans.

**LP:** That's right! You see, during the war, I was here stationed in California, and we had to slip-disc all this stuff. So that when we got somethin' from Hitler and we didn't want him to say what he said, we would edit him. So we had three turntables, and we had our earphones on. I worked for the Armed Forces Radio Service, and *my* job was to edit. Only two guys workin' with three turntables, while this one's running, you slip *this* to this one, *that* one you kill and you set up *that* one. So with three tables, you're there, *editing*. And, boy, you gotta drop it right down *there*, and listen and hold right *there*. And slip-disc on those things, and you make a one-generation down, and there you are with a speech. What bugged us is we could hear pops, and we could hear inside spaces — from outside to in — and then when we got

**"I went to Pop Olson, and I finally got him to make me  
a pair of cutter heads . . . clean right to 12.5 kHz.  
But playing it back was atrocious."**

*inside*, it went from inside to *out*. On our discs. Well, we found Hitler over there givin' speeches, and we didn't hear any pops or anything. And that son-of-a-gun would edit Roosevelt's tape, and he'd be on the air in five minutes with it. Or Churchill. And we're saying "What in the devil is *he* doin'? We can't slip *that* fast! What does *he* got goin'? Is he on wire?" If he's on *wire*, we'd hear this fidelity



**Eddie Kramer, currently a leading producer, benefitted from Paul's innovations.**

drop 'cause that's gonna roll. One minute you're on the front of it, one minute you're recording on the back of it.

So we were really befuddled with this German job, you know? When we got our hands on *that* German thing, *hell* broke loose. So in '48 unfortunately I tipped a *car* over, and I was in the hospital for a year and a half. And that year and a half I was at the Good Samaritan here, with my *arm* in a cast, *dyin'* to get my hands on a

tape machine. Because now I could see where I could *travel* — you're not gonna travel with two *lathes* in a station wagon. Where with a tape machine, you could. And I had it all figured out on an envelope as to how you could do sound-on-sound — you can do this all on one machine. No VU, no speaker; all I had was a pair of earphones and a microphone, the guitar, and a little mixer. A little box.

**PL:** And so you developed sound-on-sound? And this was '48?

**LP:** Umm hmm.

**PL:** And how about Emery Cook and his binaural recording? Was he the first guy to do more than one track simultaneously?

**LP:** I think he was, it was in that era. I didn't watch it quite that closely. Emery Cook I was very aware of, let's put it that way.

**BR:** Cook was doing discs with two separate cutting heads, and then he played it with two . . . Cook's still alive and well incidentally.

**LP:** He's up in . . . where is he? Massachusetts or somewhere.

**PL:** Tom Dowd described him as a "wild-haired genius who fancied doing raucous things."

**LP:** He was a guy I kept my eye on, and from out here we were watching him quite closely. The *problem* was nobody could get a playback arm that could reproduce what we could put on the record. Now I went to old Pop Olson who lived out on the beach, went fishin' all the time. And I finally got him to make me a pair of heads. And I said "I want these cutter heads to go to 12.5 kHz — clean. Right to 12.5. Well, he said "Mine only go to 8," and I said "Well, I'd like to get 'em to 12.5," and he said "Well, if you've got the patience to wait, I'll work on it until I get it. I have to get a different kind of rubber for the damping and so forth" and I said "All right." So he did. And he got the things out there to *almost* 12.5 and then we found that if we *rewound* 'em, then we could get 'em out there. Now we got the heads there, and we got the light pattern, and we're *lookin'* at the thing, and it's on the record. With an oscillator. So we know that we're goin' out there at 12.5, and we know the music is clean. But playin' it *back* was with a 9A cutter and a playback arm, it was *atrocious*.

Later on you get the 7,000 cycles, and we took a nosedive and it was bad news. So in about 1945, '46 — somewhere in that era — along came a friend of mine. He said his brother worked in Schenectady or wherever it was for G.E. And he pulled out of a bag six pickups. And he handed 'em to me, "They're no good to me. You want 'em?" And I says "What are they?" He says "They're pickups of some kind." So we *try* the pickup. And the pickup was a high-impedance pickup, and we said "Gee, if we run it . . . Let's try rewinding this thing down 250 ohms and see what we got." And we got that kid to go all the way out to 15,000 cycles.

**BR:** Were these the ones with the double stylus that you push the button in the top and turn it around?

**LP:** No, before that, before that. I got the original tomato cans home. So these two — we call 'em "tomato cans" — we got a pair of those goin', and the first thing you had to do was remove the four bolts that hold the turntable down because they were magnetic. Can't have any magnetic bolts or anything around it or it'll go "tuck tuck tuck tuck" you know. So, we got the tomato cans to go, and we got a flat response to 15 k and we got the cutter to 12½ k so we had that goin'. And that's when Fairchild came into the picture, and *he* actually built a replica of the garage on Curson and Sunset. He come out here with his crew — flew the whole crew out — they measured the garage off, and *copied* it. Then they went to the guy that built the *head*, copied that, and they copied the *amplifier*. But they made some fatal mistake. First of all, they didn't get the original head. They got the head that was the *old* head, with the big bumpers on the side. Olson wouldn't sell 'em the new heads, he sold 'em the *old* head, the one he'd tossed out. Just one. The *second* mistake that Fairchild made is he went to the 807s because he could get more power out of the heavier amplifier, and use four of 'em push-pull. Instead of my little ding-a-ling job. And probably many other mistakes that he made that I don't know about. I'm sure in his drive mechanisms he copied my disc machine. The disc machine was made with Wally Heider. Where his studio was, was a hobby shop, and for \$10, I

---

**“Consumer’s Research wanted to know if  
‘high fidelity’ would be offensive in their first record review.  
They wanted to use *Lover* to check their equipment.”**

---

44

rented that hobby shop. We could go in there after 10:00 at night and stay there all night and work. And we built this machine, little by little. Another friend of mine, who died, Lloyd, and I built this thing with the lathes. We cut out all this stuff, and we made the turntables and the feed screw and everything else, and as we built this thing, we had to put it somewhere, so we put it in the window. So the engineers for Arcturus Engineering happened to be walkin’ by this window, saw this machine in there, walked in, and said “What is that?” “I don’t know — two kids rentin’ this place at night are building somethin’. I don’t know what they’re building . . . .” So they got my phone number and they called me; they said “What is that?” and I says “That’s gonna be a recording lathe.” And he says “Well . . . what percentage would you want for it?” “Do you have it copyrighted?” And I says “Nah, we just built this thing.” “Tell you what — if you build us one . . . . First one you build, give to us . . . .” “It’s yours. Take it.” So they copied. Like I say, there’s 1500 of ‘em out here. You’ll see ‘em at KHJ, you’ll see ‘em at Radio Recorders . . . . You’ll probably see ‘em everywhere.

**BR:** Does Bill Robinson have one?

**LP:** Probably Bill has one. It’s a well-known cheapie tape machine that we built up. It worked perfect. With those dental belts, I was doctor to White because during the war you couldn’t get dental belts. So I just said “Dr. Paul” to S.S. White, and says “My belts are shot and I need some new belts” and, being a doctor, I got the things right away (LAUGHTER). So I got these things and some beeswax . . . Here is a funny story — very short, but very funny. We got down to fixin’ the speed. And I says “I want three speeds; 33, 78, and one right in the middle ‘cause I want to vary the speed and do these multiples at different speeds.” Happened to be 45. Damdest accident ever happened in my life! Happened to be in between and it happened to be 45. No reason — could have been 40. So we look in the phonebook — in the Yellow Pages — and I’m wondering if the guy is in there yet. So we run our finger down there and we see “cutting lathes” for doing this work that we wanted done . . . cutting the

pulleys. Goodspeed, it was. I said “That’s our man.” And he’s in Glendale. So we go there and the guy says “What do you want?” and we brought the whole lathe in this Model A Ford to him. Laid it down there on this floor and he says “What do you want?” and we say “One between 78 and 33. We got a strobe here, we can show you.” We wanted something in between there — halfway in between there. And the guy says “Well, can you guys go to a movie or somethin’ and come back in an hour? I’ll have it done.” So my friend says to me “That’ll be the day.” Come back, it was dead on when they put the strobe on it . . . He didn’t even use a strobe. He said “Take the strobe with you. I don’t need it.” He figured it out, you know? He says “What kind of groove — you want a round groove, you want a V-groove, what kind of groove do you want?” “I want a V-groove.” “You got it.”

Goodspeed was the man that put the lathe on speed, but the dynamically balanced flywheel, that’s Cadillac Flywheels. I started that thing and I says “You know, that’s gonna be one hell of a job to get this thing perfectly balanced.” Here’s how it happened: The guy’s name was King. And this fellow trained the dog for “The Thin Man.” And he said “My dog can talk. And I want to record him” (LAUGHTER). A talking dog! A talking dog is all I need now! I’ve had Pat O’Brien, the Andrews Sisters, you know, W.C. Fields — I’ve had everybody in my backyard. Art Tatum, Andre Previn . . . and a talking dog, man. So this little guy comes in here, Mr. King, and he sees me building this machine. I had taken two 16-inch discs, and cut a piece of plywood 16 inches and glued ‘em together. That was my turntable. Well, that was a pretty crummy turntable, I want to tell you, but I still got it. So he says to me “You know, you need something more rugged than that, something that when it gets up to speed . . . you may want to put a governor on that thing — you know, that wig-wags underneath there. With the springs on ‘em” and I says “Jeez, that’s complicated, and I don’t want to go that way.” So he says “Well, there’s somethin’ dynamically about . . . .” He says “What about a flywheel?” Well, we were out the door so fast, we were

down to the junkyard in a minute, asking “What do you want for a flywheel?” Only wanted a buck or whatever. Come back and you can’t beat that, those guys spent years to get that correct, right? There you are! It was that simple. Happened in ‘42.

Then in 1949, sound on sound happened, and once when Bing Crosby was in our backyard, I went to Bing and I said “Bing, you’re close to Ampex. I gotta have a tape machine. We’re doing a show every Friday night on KFI — on NBC — and it was ‘Les Paul and Mary Ford at Home’.” And I said “This show, I gotta do travelling. I may be in Terre Haute, but I gotta do this show. And I gotta have a way. If I can get a hold of this tape machine . . . .” So the idea one day came to me, the idea would be to add a fourth head to the thing. That would solve the problem.

**PL:** We’re talking about Sel-Sync?

**LP:** No, we’re talking sound-on-sound. Sel-Sync didn’t come in until ‘52. That’s when you’re listening off the record head when you’re in the record mode.

**PL:** But who was the first person to be involved with more than one track on a tape machine? Was that you, and when was that?

**LP:** That was me, ‘52. That was the first of what we call Sel-Sync, where you can overdub — you’re into that status. There probably was such things as stereo and so forth on the horizon. Stereo is nothing new, it just wasn’t accepted or ready.

**BR:** Western Electric developed stereo in the early ‘30s. They had 3-channel stereo that was better than the later stereo.

**LP:** Oh, it was here. In ‘52, no one ever said the word “stereo.” It was 1948 and I got a call from Mt. Vernon. “Consumer’s Report” — “Consumer’s Research” it was called at that time. And they wanted to know if the word “high fidelity” would be offensive to use in the first record review. And they wanted to use *Lover* as the standard of the industry, to check their equipment. And if *Lover* sounded right on their equipment, then it was cool.

**PL:** So you’d place overdubbing and Sel-Sync and multitrack — multitrack meaning more than one track — all in 1952.

# Better Than Any Pusher

**No matter how fine the fibers or how soft the "plush"  
—everything other than the Discwasher system is a pusher.**

**Pushers only line up dirt and microdust into an even line of contamination. Run your pusher off the record at a tangent—and you spread these particles into a tangent line. And microdust becomes permanently welded into vinyl by a tracking stylus.**

**Only the Discwasher system has the patented micro-tipped fibers which are directional—slanted—to pick up, hold and thus remove particles from your discs. These same directional fibers also remove fluid and solubilized contaminants by capillary action.**

**The superior record cleaner—  
better than any pusher.**

 **discwasher<sup>®</sup>, inc.**  
1407 N. PROVIDENCE RD.  
COLUMBIA MISSOURI 65201



**Tom Dowd, another producer who benefitted from Paul's ideas.**

46

**LP:** Right. 1952, and it was 1956 before we'd completely wedded the console which was built way ahead of the 8-track . . . there was Rein Narma, who was vice president or president of General Instrument Company now. Preceding that he was vice president of Ampex, preceding that he was vice president of Fairchild, but preceding that, he worked for me. The other man was Bob Flint, who is now the chief engineer of Black Company, ahead of that Addressograph I believe is the name of it. He was chief engineer of Ampex, ahead of that he was at Fairchild and ahead of that he worked for me.

The engineers that have come out of my little company — my little haven back there — are outrageous. If you look at "The Hindenburg Disaster," if you look at "Earthquake," if you look at "The Towering Inferno," if you look at "Kojak," that's all an engineer that grew up and learned engineering from me. That's John Mack. He's at Universal, and he was my engineer. Col. Ranger worked for me. Now if you want to go further than that, Rein Narma worked for me, Harry Mearns, chief engineer, RCA, no, maintenance engineer — chief of the maintenance department. Ah, if you want to take my brother-in-law Wally Kaman for 10 years did nothin' but edit for Bill Putnam — he was *the man* at Western

and United Records. Did you know Wally?

**BR:** I know his name.

**LP:** Wally Kaman? I handed him a piece of tape and told him to edit it and I think he drank a half a bottle of bourbon — just scared him to death! You see, the great part about the early days was we had no fear because we didn't know *what* to fear. We didn't know what it was all about. So we just went in there and *did* it. There wasn't anybody to say "can't do it" because they didn't know what they were talkin' about and we didn't know *either*. You know, who thought of a patch bay? — you just solder it on, that's all. I had a lump of solder big as a golf ball on there! (LAUGHTER)

**PL:** And how long was it till stereo filtered down to the public?

**LP:** We were designed for stereo unknowingly. We had everything for stereo, there has never been a thing changed on my board from 1954 till now. It's exactly as it was, and it has all the provisions that you have now. Not as many knobs as you've got now. I had a choice of slider faders or knobs and I picked knobs. It was just a matter of choice. I says "Spread 'em out, I got big hands." I says "I'm in no hurry. And I only want eight tracks." There's four on the low-level mixer — on the side — and eight across, and I got all the equalizers under the sun. Which I

never use, but they're there. And I only do that when I rescue some guy that got in trouble (LAUGHTER). If I do a date, I don't go into the 8-track — I go right to the 2-track. But the machine was built with a left and a right. And a center.

**PL:** I understand 3-track and 4-track came in pretty simultaneously.

**LP:** They come in right on top of that 8-track. Well, the 8-track, when it came out, say '56, the 8-track took out. It was a sleepin' dog, and so was the 4-track . . . and the 3-track. Three-track came out faster, because it was used in filming. So 3-track was an idea that came from filming, so that came about, and that was a dog, and had a lot of things that had to be redone. So that's when I called Poniatoff and told him that when he goes to work he's gonna find a pigeon sittin' on the Ampex on his front lawn. He said "You wouldn't do that to me." I says "I already did it. That son-of-a-gun is on your front lawn." He says "Did you put a lemon on it?" I says "No, I did everything *but*. You got that darn thing until you fix it. It's full of garbage." And he laughed. He says "Well, we'll fix it, we'll get the best engineers on it." I met one of the engineers the other night who said "they sat up all night workin' on it until they got the noise out of it.

But that didn't come in until the later years. The 3-track came in first, then the 4-track came in, and I guess the guys that really got their hands on it was The Beatles. The Beatles did all their stuff on 4-track I understand, and did an excellent job with **Sgt. Pepper**. That was a hell of an album.

I think it was more 3s than 4s when it started. Our Ampex, that we got — we had to ship it back three times, that 8-track, because the first time they sent it at 30/60. Instead of 15/30. If we stood near it, we could get killed! (LAUGHTER) Then the EQ was wrong, then they didn't have a master bias oscillator and, naturally being in the experimental stage, there was no head lifters and there was a lot of things that were wrong with it. The signal-to-noise was high, and there were many things . . . crosstalk and so forth and so on. That's where Col. Ranger came into the picture, and Rein Narma. I'm amazed that so many people . . . have kind of forgotten Narma, because he's in the marketing department at General Instruments — probably one of the most brilliant men that I've ever had the pleasure of working with. He was captured by the Russians, he was captured by the Germans, captured by the Americans (LAUGHTER), and he's from Estonia. He's a man that says

# FIDELITY TURNS INTO REALITY.

## With The ADS 10 Digital Time Delay System.

If you are a typical reader of this magazine, you already own a good stereo system and your next component will be a time delay ambience-reproduction system.

The best two-channel stereo sound is still a limited illusion — a sonic painting on the wall between the stereo speakers. You don't have to open your eyes to know that. Stereo provides a reproduction rather than the real thing. But as long as the sound is only projected at listeners from in front, stereo cannot produce the feeling of being there in the same acoustic space with the musicians. Better recordings and finer stereo components can improve the quality of the picture window view but they cannot make the breakthrough to a convincing sense of "reality" in the hearing the sounds in three dimensions. Critics and audiophiles re-creating the enveloping "ambient" sound field which surrounds the listener in any real acoustic space. Can add to a decent stereo system for \$1000 which will improve its performance as much as a good time delay ambience system can.

The ambience system you will want to own is the ADS 10 — the most sophisticated and the only complete time delay system now offered to the public. The ADS 10 is a fully optimized, fully integrated, third generation digital stereo ambience system — no need to add to your existing stereo (amplifier, amplifier, and speakers) — free of the limitations and compromises of earlier time delay units. Its components and parts work at maximum efficiency with each other, with no money wasted on redundant parts or unused capacity. The ADS 10 speakers were developed specifically for this application.

Building the amplifiers into the same chassis as the time delay circuitry, sharing the same power supply and cabinet, allows us to offer a full 100 watt per channel amp

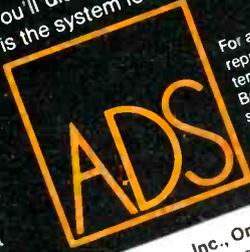
at the price of a far smaller separate amplifier. This also simplifies installation in your home by eliminating another piece of gear requiring additional shelf space and interconnecting cables.

As for the ADS 10's time-delay and ambience-producing circuitry, we invite you to compare it with others. We believe you will find it to be the best-sounding, most natural and musical, most flexible and most logically designed ambience system available.

The ADS 10 has more flexibility of control than any other system, but it is simple to operate. Design of the controls has been human-engineered so that you can easily select the size of the hall (from an intimate club to a cathedral), the depth of the stage, the location of your 'seat' and the reverberant qualities of the hall itself. An irritating problem of earlier time delay systems — the unnatural sound of the ambience-enhanced human voice, as in FM listening, for example — is resolved in the ADS 10 by a special circuit. Provision is made for adding ambience to the front channels for 'dry' recordings, as well as to your own tape recordings. An ambience-enhanced headphone outlet provides the most natural, most musical headphone listening you've ever known.

Visit your ADS dealer. Bring your favorite records with you and listen to them through the ADS 10. Experience the difference between fidelity and reality. Change the hall. Deepen the stage. Move your 'seat.' Check the features and the performance of the ADS 10 against any other time delay system.

You'll discover the ADS 10 Acoustic Dimension Synthesizer is the system for which you've been waiting.



For a comprehensive explanation of ambience reproduction and the ADS 10 Time Delay System, request your free copy of the ADS 10 Brochure. For full information on the scientific basis, design, installation, features and functions of the ADS 10, we invite you to order the ADS 10 Owner's Manual at \$5.00 per copy.

ADS, Analog & Digital Systems, Inc., One Progress Way, Wilmington, MA 01887

Please send me a copy of the ADS 10 Owner's Manual. \$5.00 is enclosed.

Please send me a copy of the ADS 10 Brochure.

Name \_\_\_\_\_ Address \_\_\_\_\_ Zip \_\_\_\_\_

10C 78 FP AM12



**Paul with son Robert on drums.**

"What's your problem?" and when you tell him the problem, he says "Well, I know of three answers right off." He never looked negative, he was a guy that always left his suitcase, his rubbers, or his kid at my house (LAUGHTER) and went home and then would call me and say "Have you seen a kid runnin' around there? It's mine." He was a real scientist — x-minded professor. The guy would walk in and I would say "I want so-and-so" and he'd write it out on a piece of paper and give it to one of my engineers and say "Go build it." And it was dead on. We'd make bets — four engineers would stand there makin' bets. John Mack, who did "The Hindenburg Disaster," "The Towering Inferno," and all that made a bet with a couple three other engineers of mine, and Johnny Hilliard was there too. We all made a bet that Rein would blow it — he couldn't be that close. And Rein said he'd be within an eighth of a dB.

**BR:** Is Dick Stumpf part of your circle, out at Universal?

**LP:** No, no. No, just John Mack — I got John Mack out here. He was with Rank over in England and came to America, I was short an engineer and I said "Anybody in here got an ear for music?" John Mack raised his hand and says (ENGLISH ACCENT) "I'd like to try. If you give me a chance." And I said "I'll give ya a chance. Come on in here" and when we were done makin' our films, around 1959, he said "Les, do you know anybody out in California?" I said "I'll getcha a job on me. I

know everybody in California. He came out here, he worked his way from the bottom all the way to the top, and he's extremely happy. I'm very proud of him, and he's one of my many... They're like *children* to me.

My son is a head at Atlantic — you go down to MCI and say "Gene Paul" and they say "That's your son? He's the *king!* The king." I'm very proud, very proud of my son.

He came to me one time, and he said "I got a problem at Atlantic. A *tough* problem." I says "There's no problem, kid." He says "Well, they're only gonna have seven fiddles and they want to make it into a whole string section. What should I do?" I says "Well, you set up the chairs for the whole bunch. And you put the *mikes* up for the whole bunch. And turn all the mikes on. And put the guys in the first row and have 'em play, and then have 'em move back to the second row and play there, and then move back to the third row and play there, and play all the way back, and you got yourself... (LAUGHTER)." Then he walked out of there, and I walked up to Atlantic one day, and Tom Dowd come to me and he says "That kid of yours is a genius! (LAUGHTER)." I says "He sure is. That's the sharpest kid you'll ever find."

I'll tell you the one that really threw Gene though. I walked up to Atlantic one day and Ertegun was in there, everybody was in there, and they're doin' whoever it was they were doin',

a big date in there. I walked in and I wasn't there two seconds and I says "You got that piano out of phase for any reason?" And everybody jumped up like they were standing at attention for the general. And my son says "Is it out of phase?" I says "Yep" and turned around and walked out. And a guy walked out with me, he says "You sure shook hell out of your son. What a joke." I says "It was no joke; it was out of phase." He said "It was?" I says "Yeah." So my son come out in a few minutes, and he says "You know what, Pop? It was out of phase." I says "I know it was out of phase."

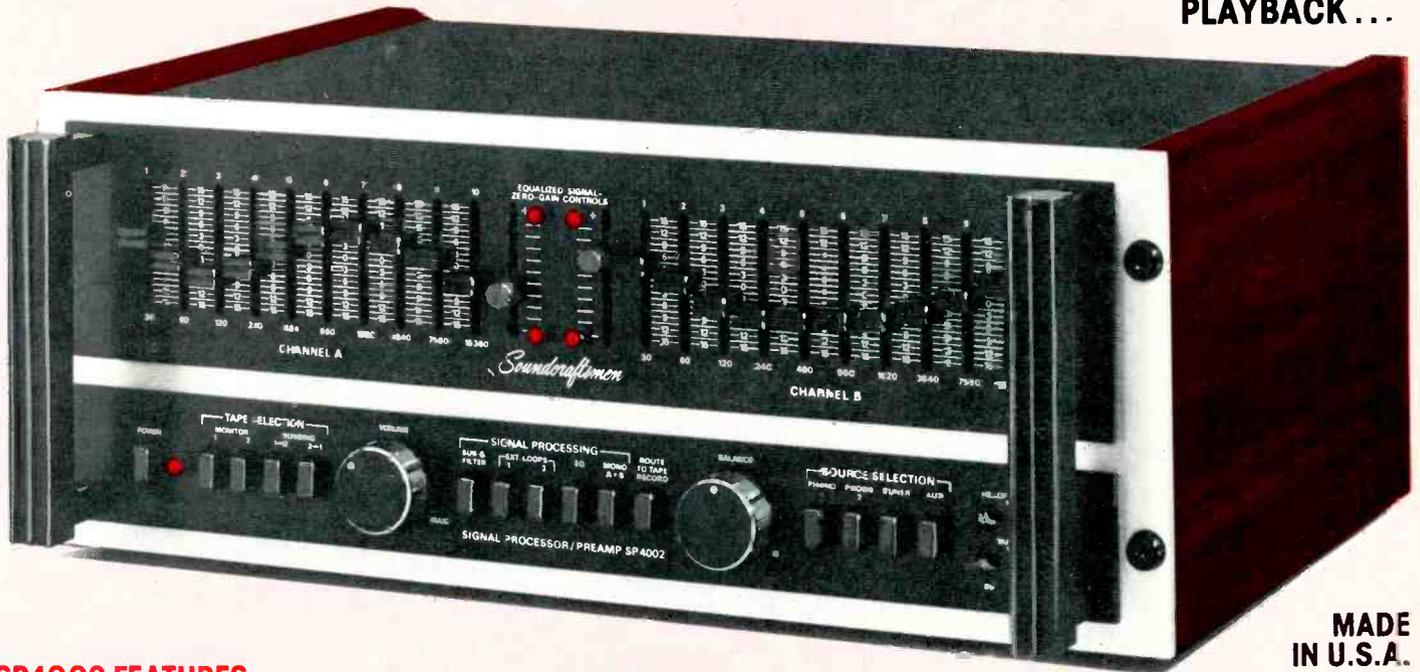
**PL:** What did you hear?

**LP:** Oh, I hear it, I hear it. Once I went to the Mayo Clinic for these ear operations, and they rebuilt me an ear. Mayo Clinic said "We're gonna put a hole in your ear that's so small water won't go through it but we can get this high-powered microscope and see if there's any granulation or any liquid behind it." And I says "Okay." After a couple of days, I went back there, and the doctor says "Uh, how's your hearing?" I says "Lousy." And he says "Well, what's it like?" and I says "Well, its down 40 dB at 125 cycles." He says "It's *what?* That's *impossible!*" And I says "I can tell, just right like that." Guy called in the other doctors. There's all these doctors comin' through and they get ready to run another test and put it right over the top of the other test, in another pencil, red pencil. So I says "Well, fore we make this test, what is the bet?" and he says

# Soundcraftsmen

**EQUALIZERS...  
PREAMP-EQUALIZERS...  
CLASS "H" AMPLIFIERS...**

**"THE PERFECT PREAMPS" - OCTAVE-WIDE TONAL CONTROLS, PLUS PUSH-BUTTON SIGNAL-PROCESSING PATCH-PANEL, FOR OPTIMUM FLEXIBILITY IN PROGRAMMING, SWITCHING, PLAYBACK...**

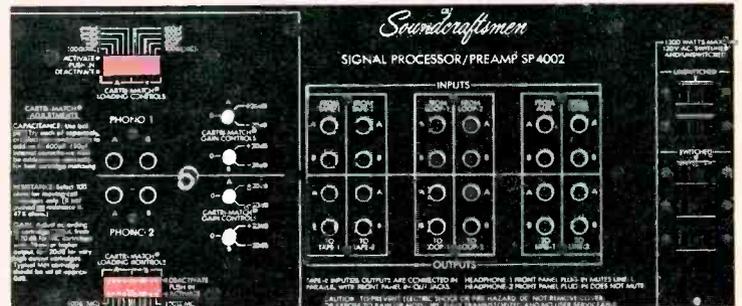


**MADE  
IN U.S.A.**

## SP4002 FEATURES:

- Dual 10-band  $\pm 15$  dB Equalization
- Zero-Gain/LED Level Balancing
- Sub-Sonic Filtering—15 Hz
- Variable Cartridge Loading
- Variable 47K/100 Ohm Phono Impedance
- $\pm 20$  dB Phono Level Adjustment
- Moving Coil Cartridge Inputs
- Four Mono Phono Preamplifiers
- Three-way Tape Dubbing
- Two Amplified Headphone Outputs
- Two External Processing Loops
- Stepped Level Control
- Zero-Defnet Slide Potentiometers
- 19" Rack Mount Brushed Aluminum Black & Silver Overlay Panels
- Front Panel Tape Inputs & Outputs
- Includes Environmental Test Record
- Computone Charts for "EQ" setting

The new SP4002 **SIGNAL PROCESSING** Preamp is the most flexible preamplifier available. Its **PUSH-BUTTON PATCHING** capabilities are endless. The SP4002 was designed for those audiophiles who take a "HANDS ON" approach to their equipment. For tonal flexibility, we have included **TWO TEN OCTAVE GRAPHIC EQUALIZERS**. For the tape enthusiast, the SP4002 is capable of handling up to three tape recorders with **THREE WAY** dubbing control. Along with this are **TWO SIGNAL PROCESSING LOOPS** for added accessories, a subsonic filter and stereo/mono mode switching. Our unique **CARTRIMATCH**® phono preamplifier design allows the use of two moving coil cartridges **without** head amplifiers and **ADJUSTABLE CARTRIDGE LOADING** on phono 1 and phono 2 from 50 to 800 picofarads. Again the Soundcraftsmen tradition of "affordable separates" is continued.



## NEW CLASS "H" 250 w. Amps...

## PE2217-R Preamp-Equalizer...

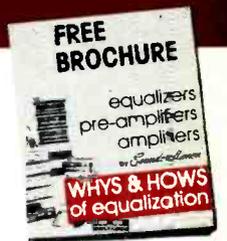
## FREE BROCHURE



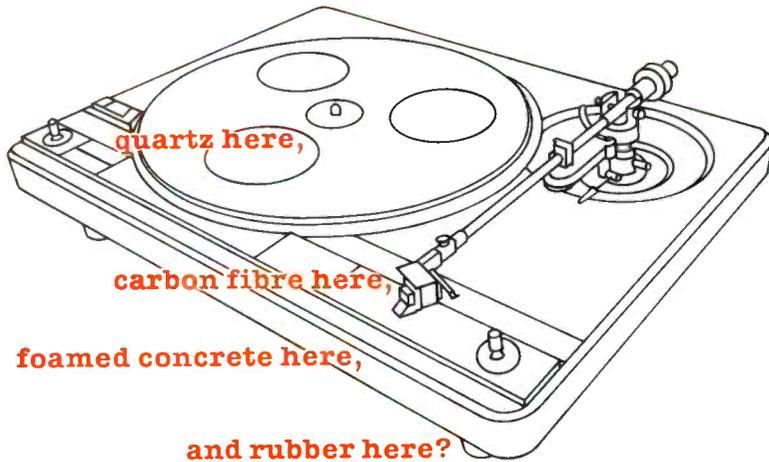
The new **CLASS "H"** ANALOG logic Vari-Porter® circuit with **AJTC-CROWBAR** protection circuit, input level controls, adjustable range meters, main and remote speaker selection, clipping indicators, **VARI-PORTRIONAL**® indicators and speaker protection. 250 watts RMS minimum p/e 20-20KHz @ 8 ohms, less than 0.1% THD, T.I.M. better than 0.02%. **NON-LIMITED** output assures crisp clean peaks. 3 modes. From \$649.

Now the PE2217, rated "STATE-OF-THE-ART" and "BEST-BUY" in magazine Test Reports is available as the PE2217-R in rack silver-black form as a matching mate for our new amplifiers. With the control flexibility of pushbutton-patching for tape monitoring and tape dubbing between two or three machines together with tape and program-discrete-octave equalization, the PE2217-R is the **MOST POWERFUL** and **FLEXIBLE** Preamp available at \$549.00

Includes **TEST REPORTS**, complete specifications, **Class "H" amplifier ENGINEERING REPORT**, **EQ COMPARISON CHART**, and the **"WHY'S & HOW'S"** of equalization—an easy-to-understand explanation of the relationship of acoustics to your environment. Also contains many unique **IDEAS** on "How the Soundcraftsmen Equalize can measurably enhance your listening pleasures;" "How typical room problems can be eliminated by Equalization;" and a **10-POINT "DO-IT-YOURSELF" EQ** evaluation checklist so you can **FIND OUT FOR YOURSELF WHAT EQ CAN DO FOR YOU!**



What do you get when you put



# ADC THE FIRST LOW-MASS, TURNTABLE.

ADC is in the business of building breakthroughs.

First, we brought you the innovation of the low mass cartridge. Then the remarkable computerized Accutrac® turntables. Next, the State-of-the-Art Low Mass tonearms.

And now, our engineers have combined the latest advancements of tonearm technology and turntable construction to reduce mass and resonance to new lows.

Result: new benchmarks of high performance.

Finally, the integration of a carbon fibre design tonearm. The famous ADC LMF Carbon Fibre tonearm was the model for the sleek black anodized aluminum

tonearm found on the ADC 1700DD.

In fact, until now you had to make a separate investment in an ADC tonearm to achieve this level of performance.

A level of performance never before available on an integrated turntable.

It is statically balanced with a lead-filled decoupled counterweight, and the headshell is molded carbon fibre, long known for its low mass to high tensile strength ratio.

Furthermore, the headshell is connected to the arm with gold plated computer terminal pins. And the main bearing cradle is made of sintered aluminum. The pivot system utilizes micron polished instrument bearings which are hand picked and matched perfectly to both the inner and outer races, for virtually frictionless movement.

The viscous cueing is a gentle 4mm/sec., and the tempered spring anti-skate adjustment is infinitely variable to 3.5 grams.

The design, the materials and the details interact to provide incomparable performance for a tonearm on an integrated turntable system.

In fact, the tonearm alone is worth the price of an ADC 1700DD.

Finally, resonance conquered.

The technical know-how that conquered the problems of the tonearm mass, also conquered the problems of turntable resonance.

The ADC 1700DD reduces resonance to levels so negligible they are virtually nonexistent.

The achievement lies in the innovative construction formula for the turntable base that incorporates the latest advancements from European engineers.

The base is constructed with two dissimilar materials that are resonance-cancelling. First, the outer frame of the base is molded, and then a composition of foamed concrete is injected to absorb and neutralize resonance and feedback.

Enter No. 2 on Reader Service Card

# LOW RESONANCE

Beyond even this foamed concrete anti-resonance breakthrough, the base is isolated by energy absorbing, resonance-tuned, rubber suspension feet.

This is as close as technology has ever come to defying the physical laws of resonance.

The motor in the ADC 1700DD is also present standard of excellence: Direct Drive Quartz Phase-Locked Loop. The quartz is used in the reference oscillator of the motor.

An electronic phase comparator constantly monitors any variance in the speed, making instantaneous corrections. Even when out of the Quartz-Locked mode, the optical scanning system keeps drift at below 0.2%.

In fact, to check the speed at a glance, we've engineered the 1700DD with a pulsed LED strobe display for your convenience.

Low-mass. Low-resonance. High performance.

What is the result of all these breakthroughs? Pure pleasure.

The pleasure of enjoying your favorite music with less distortion and coloration than you may have ever experienced before. Now you can truly appreciate the integrity of the original recording.

Our engineers have reduced record wear and music distortion to a point where rumble is -70dB Din B, and Wow and flutter less than .03% WRMS.

In the history of audio technology, significant breakthroughs have been made over the past four years with the development of Quartz Lock Direct Drive, carbon fibre tonearm design, foamed concrete anti-resonance construction. And now, ADC is the first to bring them all together in the 1700DD. We invite you to a demonstration of this and the other remarkable ADC turntables at your nearest franchised ADC dealer.

Or, if you'd like, write for further information to: ADC Professional Products, a division of BSR Consumer Products Group, Route 303, Blauvelt, N.Y. 10913.

Low-mass. Low-resonance. We think you'll be highly interested.

Distributed in Canada by BSR (Canada) Ltd., Rexdale, Ont.  
\*Accutrac is a registered trademark of Accutrac Ltd.



"Well, you got the Mayo Clinic free if you win. If you lose you pay for it (LAUGHTER)." I says to myself, "I can't lose on that deal." And if I go up there now and if I announce my name, I'm the next one in. I mean I don't get no bills. And they said "Can we put it in a medical journal?" I said "You can put it anywhere you want." He says "We must have been gettin' up and drivin' a hayrack!" I said "I know what you're gettin' but my ear is so tuned to what I'm hearing, that I know if it's 6 dB, 8 dB, 4 dB, and at what frequency I'm hearing what . . . ." And I was on the operating table, and during the middle of an operation the guy takes a tuning fork and hits it and asks me what key it's in. Right? So I named it and the guy says "You're right." I says "This is the damndest thing I ever heard. Here you're choppin' my head up, and you want to know what key I hear!"

**BR:** I was waiting for the story you said you were gonna tell about Jazzbo Collins . . . and his ball of string.

**LP:** Oh, the ball of string! Well, I'm goin' overseas, and I'm over Alaska in

saves string." He says, "So? What's so bad about that?" I says "I didn't mind it when it was a little ball. But when it got so big that I had to cut a hole in the apartment . . . 'cause the ball got so big . . . (LAUGHTER)." When you pack a lunch every Sunday and take a flashlight to check the knots! I'm living with a ball of string in my house and "this string is gettin' out of hand — every time she sees a piece of string she picks it up and adds it on to this ball (LAUGHTER), and I can't take it anymore." And he says "Well, when she comes out, can I talk to her?" I said "Sure (LAUGHTER)." And when she comes out, they're tryin' to talk her out of this ball of string, and she's lookin' at 'em dumbfounded (LAUGHTER). And another guy's talkin' to me saying "Look, a ball of string isn't the end of the world. You can always put the ball of string in a separate room (LAUGHTER)." And this went on all the way to Japan . . . . And I guess about the second and third place I played, I walked out on that stage and they says "Here he is, Les Paul!" and I walked out and right in the front row

**PL:** Les, do you remember the first record you were ever on that was commercially available? Was it a single?

**LP:** It was a hit. It was called *Just Because*. Made in 1930, for Montgomery Ward.

**BR:** Was this the one that goes "Just because you're a da da da . . .?"

**LP:** No. "Just because you think your hair is so curly / Just because you think you're so hot / Just because you think you've got something / That nobody else has got." Oh, it was a big hit.

**PL:** So you were the artist — as "Les Paul"?

**LP:** "Rhubarb Red." I made \$20 (LAUGHTER). And it took about four, five years for it to be a hit.

**PL:** And what was the label there, do you remember?

**LP:** Champion, I believe. I think it was Champion. I do not have that record, but it was made on gravity feed. A gravity-feed recorder.

**PL:** I don't know what that means.

**LP:** Well, you just write down "gravity feed" and there'll be a lot of questions asked. But that means it's got a weight, and it goes toward the ground at the speed of gravity and that's what makes your turntable go at 78 rpm. And that's a beaut. And then you crank it up and start all over when it hits the floor. It's a counterweight. It's non-electric. You crank it up to lift the weight up but that's it. And the VU meters. . . I'll never forget the early VU meters. You say "Hello" and that needle'll start to move (LAUGHTER), and about two minutes later it says "Hello." It goes like that (DEMONSTRATES), that meter. The damping on that meter was unbelievable — guy says "Watch the meter." I says "You gotta be jokin'. I'll be half done with the number by the time that meter moves!"

**PL:** You sang and played guitar on this record?

**LP:** Yes, and harmonica. The other side of that was *Deep Elm Blues*, and that was a hit too.

**PL:** Les, you mentioned some non-standard-speed recording, as double-speed guitar, say? When did you first do that?

**LP:** Well, that came about in '46.

**PL:** And so were you the first to do that — to playback. . .

**LP:** Yes. As far as I know.

**PL:** How about backwards recording?

**LP:** Oh, sure. Meredith Wilson was the one that brought it to my attention. That didn't happen until maybe 1947, when I made the records for Capitol I found out that you better make 'em backwards because of the transient response, and when you start goin' up there double-speed, and you're laying

**"I'll never forget the early VU meters. You say 'Hello' and about two minutes later, it says 'Hello.' The damping was unbelievable."**

the lounge and this guy comes up to me and he says "You know, I'm an engineer with so-and-so." He don't know who I am, I don't know who he is. I'm listening to him talk and he asked me what business I was in. I had to think of a business, so I said "I'm in the garment business." And I don't know where I picked that up. Just then a woman wanted to get in the bathroom. So I ask her if she had a dime, and she digs in her pocket lookin' for a dime and I said "I was only kiddin'. You can get in for nothin' here." The guy says "Hey, that's a good-lookin' chick." And I says "Watch it, that's my wife." I never seen that gal before. "Oh," he says, "I'm sorry." I said, "Don't feel sorry about it because we're breakin' up. This is our final trip to get over it — gonna try and cement it up but "we'll never make it." He says "That's a shame. Look, you're a perfect matched pair here, you know (LAUGHTER). I says, "Never make it." She's too far out for me." He says "What's the matter with her?" and I says "Well, she saves string. (LAUGHTER)." "She does what?" "She

is this guy (LAUGHTER). And he says "Have I been had! Boy" he says, "did I get sucked in on that story."

You know I tell these stories like now and there was one where I went to Brazil and we didn't want to be known. We were there early and I said "I want to see Brazil without being bugged with a lot of things and people." I said "I'd like to go in there with a pair of Levis, walk down the street and see what Brazil's all about." So I registered in as Lester Polefuss. Come down in the lobby and the guy said "You Lester Polefuss?" I says "Yeah." He says "Can I speak to Mary Fordus? (LAUGHTER)"

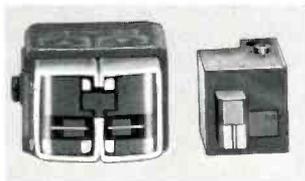
I went to get the Grammy award and I registered in as Lester Polefuss and I'm there a week before the Grammys. One day this lady said "I'm dyin' to tell you who you are (LAUGHTER)." She just says to me "Mr. Polefuss, I'm dyin' to tell you who you are." Then she starts hummin' *How High the Moon* and I'm thinkin' "I don't believe it." One of the funniest lines — "I'm dyin' to tell you who you are." I couldn't believe it!

The Realistic SCT-30 tells it like it is:

# Why 3 heads are better than 2. Why 2 capstans are better than 1. Why double Dolby\* is better than single.

## 3 Heads.

Two independent record and play heads eliminate the compromises of one combined r/p head, and the head assembly is integrated to eliminate azimuth error. The result: cleaner sound. The third head lets you monitor



your recording an instant after it's made, without interrupting the program. SCT-30 has 3 heads!



## 2 Capstans.

Dual capstans (instead of the usual 1) reduce wow and flutter to an inaudible 0.06% WRMS or less, and extend the audio frequency response. SCT-30 has dual capstans!

## Double Dolby.

You know the single Dolby system cuts noise and adds dynamic range. But let's examine double Dolby. You get Dolby on both record and monitor so you know exactly what your tape will sound like.

You get a decoder for recording superb Dolby FM stereo. And you get simultaneous listening enjoyment of the decoded broadcast on receivers with tape monitoring. The Realistic SCT-30 has double Dolby! About \$380.



## P.S. - Supertape® Gold.

To go with 3 heads, 2 capstans and double Dolby, you need a cassette tape that will enhance — not degrade — performance. That's why we design and manufac-

ture Supertape Gold in our own Fort Worth factory. Like SCT-30, it's a playmate you can believe in at a price you can afford.

## Why Realistic®?

Because Radio Shack has delivered quality audio at sensible prices since 1921, its Realistic tape and recorder line can point to over 5,000,000 customers as living proof of these claims. Add after-sale service that isn't lip service. Add in-house engineering and manufacturing of much of the Realistic line. And add the convenience of neighborhood shopping where you get "sound talk" from a specialist. That's Realistic!

\*TM Dolby Laboratories, Inc.



**Radio Shack®**  
The nationwide supermarket of sound™.

Radio Shack is a Division of Tandy Corporation. Fort Worth, TX 76102. Over 7000 locations in nine countries.

"...presence and definition throughout the frequency range make this a spectacular system demonstration record."

Alan Penschansky, Audiophile Recordings Column, *Billboard*, 4/22/78

## Big Band Jazz

### Direct-to-Disc Recording

UMB-DD7 \$14.95

Read the review. Then listen to big band jazz at its best, performed by the Humber College Jazz Ensemble and captured by Umbrella direct-to-disc technology.

Direct-to-disc eliminates the tape recorder to insure maximum dynamic range, wide frequency response, minimum distortion and lowest surface noise. An expert was impressed. You will be too!

**StandarDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-3  
33 Shiawassee Ave., Fairlawn, Ohio 44313

"...Sonic Arts' best classical effort to date."

Alan Penschansky, Audiophile Recordings Column, *Billboard*, 3/11/78

## Sonic Arts

### Direct-to-Disc Recording

TO HONOR THE TRICENTENNIAL OF ANTONIO VIVALDI 1678-1741

HEIICHIRO OHYAMA  
with the Cremona Chamber Ensemble

300

SA-LS8 \$14.85

Read an expert's review, then judge for yourself. You'll hear The Cremona Chamber Ensemble's magnificent commemorative performance of Vivaldi's *La Prima Vera* (from *The Four Seasons*) and others, captured by Sonic Arts direct-to-disc technology.

Direct-to-disc eliminates the tape recorder to insure maximum dynamic range, wide frequency response, minimum distortion and lowest surface noise. Alan Penschansky was impressed. You will be too!

**StandarDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-4  
33 Shiawassee Ave., Fairlawn, Ohio 44313

that's crazy. You're gonna break the mike." I says "I haven't broken a mike yet. Everything is fine." "Well, you're gonna pop the Ps," they said. I says "Then let 'em say B instead of P." And it wasn't long before I had to put two mikes up and told 'em to sing in that mike and I recorded on the close mike. So this guy is singin' like mad right into this distant one and the one right next to him is the one that I'm really getting him with. So I would get him, I would fool this guy. We'd put a pencil right across the center of that microphone so he wouldn't pop his Ps.

**PL:** What was the close mike for in this case?

**LP:** The close miking essentially was because there was noise in my amplifier, because I was a low-level mixer. That's what I had, a low-level mixer. A low level means that you are controlling with a T-pad before, from the microphone looking into the preamp. In every console you look at today, your volume is controlled after the preamplifier. So you've already cremated the amplifier. You're going to go like that (*CLAPS HANDS*), and you've killed it.

**PL:** We're talking about distortion?

**LP:** We're talkin' about distortion. We're talkin' about you *cannot* overload anything that's got a pot hangin' right in front of the microphone, right there before it ever gets to the preamp. So I had the cleanest records that ever came out. So when the piano player went up and hit one of the big chords . . . Like I played last night, you're hearing these tremendous sounds come off an acetate, where everybody says "My God, what in the world is happening? Why?" And it was a very simple thing — I had to close-mike. Because if I backed the guy that far away, you got so much noise, you couldn't believe it. So I had to bring the guy right up tight in here, when I brought him tight in, a *second* thing happened. You should never put a resistive load across a microphone. If you do, you change the response. But nobody found out that the response is to your advantage. That it took the bass out of the 44. So, with the 44, as you moved in, the bass built up. But when you put a resistor across it, it took the bass out. So by accident, I found out that by leaving the T-pad in there, you move the guy right into the microphone and you have the same thing as you did if it wasn't in there and you're *three* feet away.

**PL:** But weren't the vocals always recorded fairly close? Even in the *Big Band Era*?

**LP:** In the *Big Band Era*, they may have got that close (*DEMONSTRATES*), but you never walked right up to the mike.

You never got right where you had lip-stick on the mike, no.

**PL:** So you were the first to close-mike instruments, anyway.

**LP:** Yes. When you get a violin, and the bow is just runnin' right straight across that microphone, when, you get a trombone with the microphone *in* the bell, with a Saltshaker — or a whatever — you say, "This is ridiculous." And I've had many a guy from MGM say "I won't record in that room. I just came from Republic Sound Stage, and if you think I'm goin' in that dumb garage and play one inch from a microphone, you're crazy." So I'd say to the musician "Would you mind playin' a couple of notes, come in and hear it yourself and *then* make up your decision whether you'll record in my studio or not?" One guy was hired on a date, and he says "I don't care how much you pay me. A microphone should be that far away." Now that's the way he was brought up. So the microphone'll be over there where those *lamps* are; this is the way he's used to recording a string quartet, and he just doesn't. . . . And this was the industry — the standards of the industry. It was *not* to chuck a mike down your throat. *Bing Crosby* was the first one to say "I never heard sound like this in my life. The guy swallowed the mike." He says "This is . . . ridiculous. It's the greatest sound I ever heard in my life. That guy, you can hear him breathe. You hear every sound in his voice." You see, this is because you're capturing everything you want to capture. If you don't want to capture it, don't.

**PL:** So when was it that you first close miked the instruments? What year?

**LP:** I close miked right from the beginning. So that goes back to '42. Starts right from the time that I built the mixer and the whole thing. . . .

**BR:** This overpowered the noise in your amplifier.

**LP:** That was the basic idea, 'cause without it I was in trouble (*LAUGHTER*). More accidents happened in my lifetime that turned out to be . . . some of the greatest things that ever happened in my life were just necessities. In fact, all of 'em were necessities.

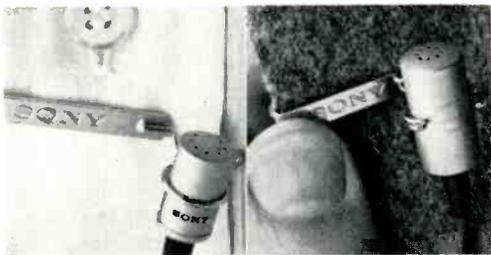
**BR:** How do you feel about playing through an amplifier into a microphone versus playing from a pickup right into the board?

**LP:** Well, now there's a good question. Now you may find that going direct into the board is a direct sound, an intimate sound. It's as close as you can get; you can't get no closer than direct. Direct, I happen to prefer because it's so pleasant, and you can do so much with it. But many times I'll place a microphone as much as across the room.

# People who speak for a living speak highly of Sony.

Whether you speak for a living, or sing for your supper, you'll agree: what you have to say is as important as what you say it into.

That's why Sony microphones are so often found at radio and television stations, and recording studios.



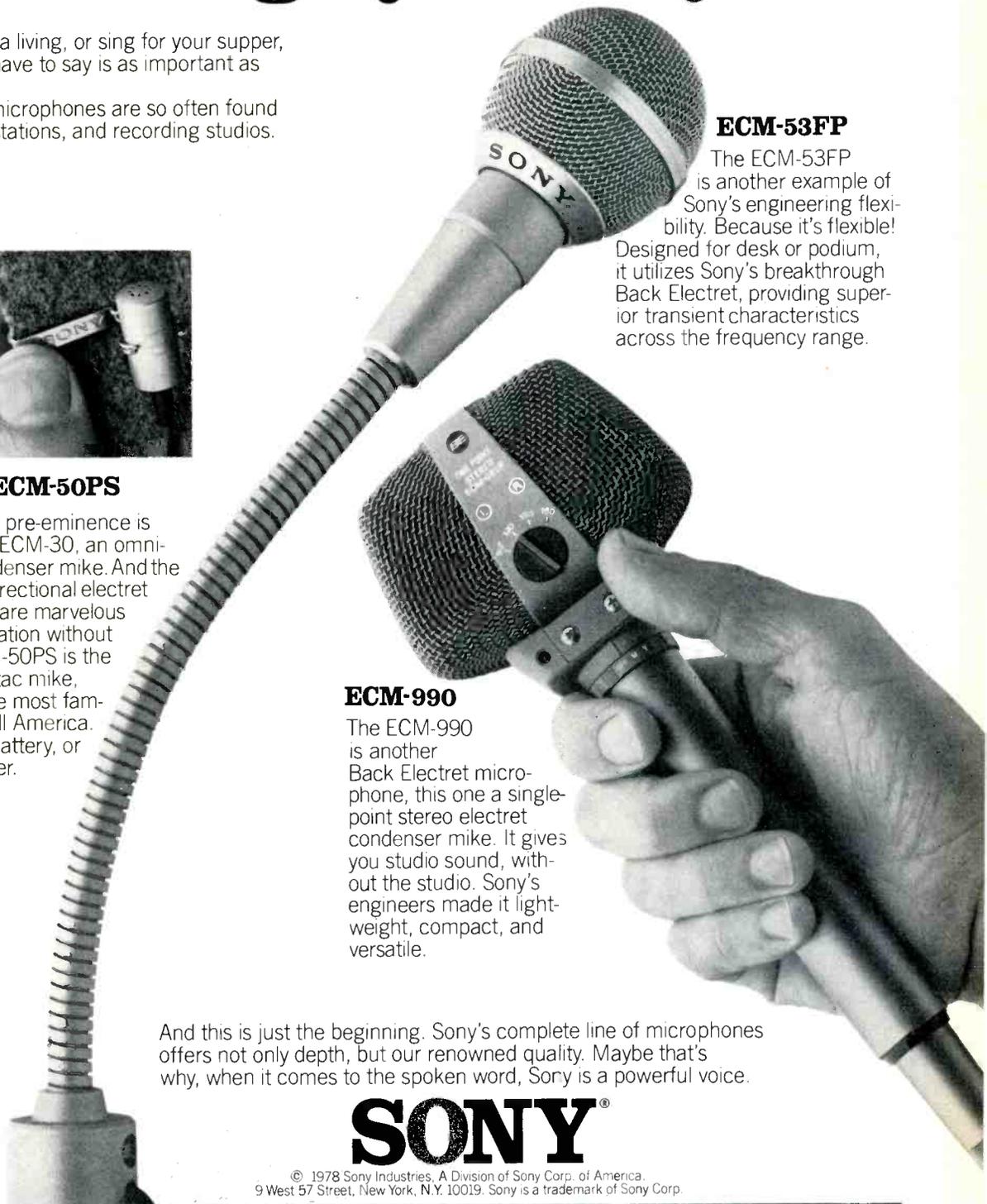
## ECM-30

## ECM-50PS

A big reason for Sony's pre-eminence is two small reasons: the ECM-30, an omni-directional electret condenser mike. And the ECM-50PS, an omni-directional electret condenser mike. Both are marvelous examples of miniaturization without compromise. The ECM-50PS is the standard television tie-tac mike, seen below some of the most famous Windsor knots in all America. It can be powered by battery, or external phantom power.

## ECM-41

The ECM-41 is Sony's uni-directional condenser mike for studio interviews. Because you can point it, you won't miss any pointed questions. And it telescopes.



## ECM-53FP

The ECM-53FP is another example of Sony's engineering flexibility. Because it's flexible! Designed for desk or podium, it utilizes Sony's breakthrough Back Electret, providing superior transient characteristics across the frequency range.

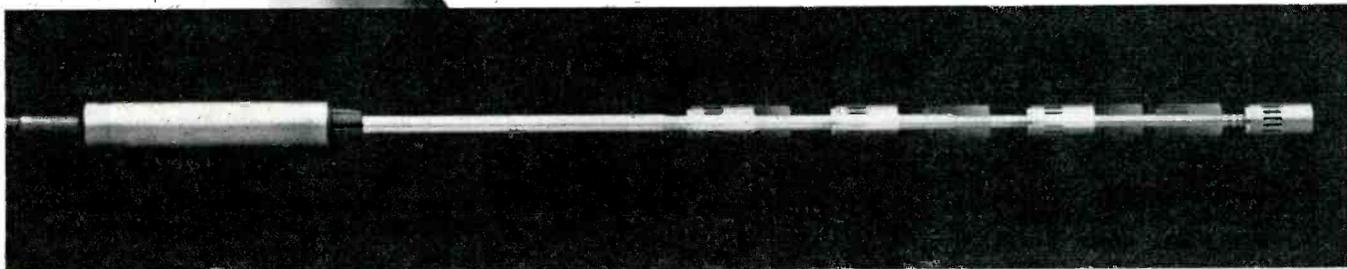
## ECM-990

The ECM-990 is another Back Electret microphone, this one a single-point stereo electret condenser mike. It gives you studio sound, without the studio. Sony's engineers made it lightweight, compact, and versatile.

And this is just the beginning. Sony's complete line of microphones offers not only depth, but our renowned quality. Maybe that's why, when it comes to the spoken word, Sony is a powerful voice.

# SONY®

© 1978 Sony Industries, A Division of Sony Corp. of America.  
9 West 57 Street, New York, N.Y. 10019. Sony is a trademark of Sony Corp.



Enter No. 58 on Reader Service Card

"...jazz collectors as well as sound buffs will require this album."

Alan Penchansky, *Audiophile Recordings Column, Billboard, 2/25/78*



(45 RPM) RDC-3 \$14.95

Listen to an expert. Then listen to this sizzling contemporary jazz performance by the Lew Tabackin Quartet, captured by RCA/RVC direct-to-disc technology.

Direct-to-disc eliminates the tape recorder to insure maximum dynamic range, wide frequency response, minimum distortion and lowest surface noise. An expert was impressed. You will be too!

**StandardDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-6  
33 Shiawassee Ave., Fairlawn, Ohio 44313

"I enjoyed every bit of both sides,"

Tape and Turntable Column, *Audio, 4/78*



Philip Frank, Violin Bernard Frank, Piano  
UMB-DD3 \$14.95

You'll agree with *Audio Magazine* once you hear the exquisite sonatas composed by Efrem Zimbalist Senior and Junior, captured by Umbrella direct-to-disc technology.

Direct-to-disc eliminates the tape recorder to insure maximum dynamic range, wide frequency response, minimum distortion and lowest surface noise. The experts were impressed. You will be too!

**StandardDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-5  
33 Shiawassee Ave., Fairlawn, Ohio 44313

And pick up a speaker. And multi that kid. I won't do it with their funny boxes. I have a lot of funny boxes, but I don't do it that way. I do it the correct way, where you take a multi off the preamp, feed it out there, feed it into a speaker, take that speaker and put that microphone over there at a distance. Jimi Hendrix called me one day and asked me, how he would do it? How he *should* do it? And I said "That's the way I would do it."

**PL:** *It was direct and distant miked?*

**LP:** Direct and distant miked. And now the distance of the miking is up to him because there is a certain sound that you get out of this non-linear string, non-linear pickup, non-linear guitar — okay? — coming out of a non-linear speaker, out of the wrong box, out of a wrong guitar, but they sound great, so that these two wrongs make a right. And this sound that he gets out of this dumb speaker and this dumb guitar turn out to be great. And he *wants* that sound.

**PL:** *Well, Eddie Kramer used direct and distant and close miked all the time.*

**LP:** Eddie Kramer did it, was working for Jimi Hendrix — that was at the Electric Lady, that's where it happened. He was the guy who'd asked me. This is where it came about. So when you're saying Eddie Kramer, you're talking about Eddie Kramer worked for the Electric Lady and Electric Lady was owned by Jimi Hendrix and Jimi Hendrix was the guy that called me. And he says "Hey, I wanna get that real raunchy fuzzy dirty down ... you know, that."

**PL:** *Probably "big" sound.*

**LP:** Yeah, that *real* big sound. You know, the Led Zeppelin came in there later on with ... doin' a similar thing to that, with Jimmy Page and the bunch of guys there, you know.

**PL:** *More guitar effects-oriented here. How about tremolo? When did that first start happening?*

**LP:** Well, tremolo ... Where did the tremolo come from?

**PL:** *Was it on an amp, first of all, or was it a separate unit?*

**LP:** Yes, it was on an amp. No, it was not on an amp. The first tremolo was mercury, in a little tube, and it used to jiggle with the motor. You turn the motor on, and it would jiggle and would change the amplitude. And it was strictly amplitude and not vibrato — vibrolo. It was a change in amplitude, and it was on a motor. This was just before ... it was back in the '40s somewhere.

**PL:** *How about phasing?*

**LP:** Oh, phasing came in, and it came from a guy out here in California. My

phasing came about by puttin' two discs on at the same time and getting 'em out of phase.

**PL:** *Are we talking about a shift now or just ...?*

**LP:** It's shifting, it's shifting in and out. I was in the army and I was listening to Tokyo Rose. She was on every day and that's how I used to hear my records — in the Armed Forces Radio Service. And the station would go in and out of phase, because, you know, overseas. So you'd have this shifting ...

**BR:** *Just from the fading pattern.*

**LP:** From the pattern. And my little son, who is now the #1 engineer at Atlantic — and his brother — they used to come in and say "Can I change the radio, daddy?" and I'd say "Okay." And I'd become fascinated to see what stations they'd pick. And they didn't pick a station with music — they picked the station that was out of phase. And this intrigued 'em. I looked at the kids and I says "You know, it must be commercial (LAUGHTER). It must be commercial." So I says "How am I gonna do this?" You know what I'm gonna do? I'm gonna put two records on ... just let two records go — get 'em right together — and see if they would cancel each other out. And they *would* cancel each other out, and I put on a Variac. I just put a Variac on it — I'd bring it in and I'd bring it out, and I started to get this shifting back and forth.

**PL:** *And about when was this?*

**LP:** Oh, that was somewhere in '46, maybe '45, or somethin' like that.

**PL:** *And did you use this for selected instruments on your records?*

**LP:** Oh, sure. Used it with Mary a lot, and I used it because there'd be a lot of voices goin' here and there and we'd use it on the guitars.

**PL:** *When did people start limiting? Limiting and compressing?*

**LP:** The limiting came about in Atlantic City, when Jim Conklin at Columbia Records says to me "You have turned the world upside down. Columbia Records is goin' crazy. We had a meeting the other day and your ears must have been burning." Columbia had their convention at the same time Mary and I were playin' Atlantic City. And he says "Les, what you're doing on a phonograph record, we've got to do with Frankie Laine, with other people. And we can't do it, because they got one note at zero on the meter and the next that don't move it at all." He says "Everything you play, that needle stands still." I says "It's simple for me because I'm my own limiter." I didn't know the word "limiter" then — but I says "I do my own balancing, controlling by



## The new Dual 819.

**To fully appreciate what comes out of it, you should know what Dual engineers put into it.**

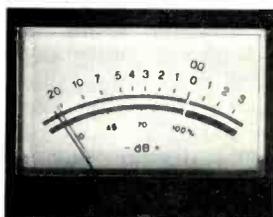
The first time you listen to a recording made on the Dual 819, you'll know it's a high-performance cassette deck with superb specifications. Not only from the way it sounds, but from the positive feel of the operating controls, the quiet smoothness of the tape movement, the accuracy of the meters.

That may be all you need to know. But since you'll be more involved with your cassette deck than with any other component, we want you to know much more about the way Dual engineers designed the 819. And why you can expect many years of reliable performance from it.

### Speed varies less than 0.05 percent.

It takes quite a drive system to keep tape speed variations below 0.05 percent at 1 $\frac{7}{8}$  inches per second. The 819's tape drive system starts with a high-torque DC servo motor whose speed accuracy is determined by an integral frequency generator.

The large speed-stabilizing flywheel—precisely machined and dynamically balanced—is coupled to the motor by a flat-ground drive belt. An independent belt handles



Dual's equalized meters prevent distortion when recording high frequencies.

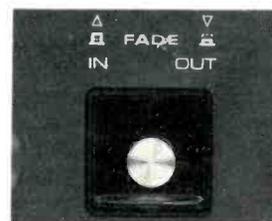
the clutches and take-up spindle during play and record. A geared drive is switched in for the fast-wind modes.

You can change from mode to mode in any sequence—even from fast forward to eject—as fast as you can press the switches. The tape will never spill or snarl—the innovative braking system engages the feed-spindle a split second ahead of the take-up spindle. And if the cassette-tape malfunctions, Dual's unique photoelectric tape-motion sensor stops the machine almost instantly.

### Equalized record-level meters.

Although all cassette decks "equalize" the incoming signal by boosting the high frequencies, only decks with "equalized" record-level meters read this boosted signal. Conventional meters read only the unequalized signal—which can lead to distortion when recording high frequencies. The 819 is one of the very few decks on the market with equalized meters.

The tapeheads are hard Permalloy for the optimum combination of wide frequency response, low distortion and extended wear characteristics. A four-point tape guidance system assures perfect tape-to-head alignment. The tape compartment door is viscous-damped. It opens smoothly and silently—and provides easy access to the tapeheads for cleaning.



Dual's unique Fade/edit control lets you edit recordings after you've made them.

### Electronic fade/edit.

The 819's unique Fade/edit control electronically edits recordings during playback by selectively activating the erase head. You can fade out any unwanted sounds (commercials, for example) and then fade back into the music—while listening.

### Plus all these features:

Output level controls match the deck's output to your amplifier's. Headphone-level controls. Memory-stop in both directions. Special limiter circuitry affects only potential recording overloads, not overall dynamic range. Bias/equalization for the three basic types. And Dolby®, of course.

Now you know quite a bit about the 819. Enough, we think, for you to visit a franchised Dual cassette deck dealer where you can see and operate it yourself. If you compare the 819 to much higher-priced decks you'll appreciate it all the more. And you'll know why.

United Audio,  
120 So. Columbus Ave.  
Mt. Vernon, NY 10553



Enter No. 18 on Reader Service Card

"...percussion effects that are dynamite in the binaural recording process."

Alan Penchansky, Audiophile Recordings Column, *Billboard*, 2/25/78



SA-LS7 \$14.95

Read what an expert has to say about this binaural recording of explosive free style jazz, captured by Sonic Arts direct-to-disc technology.

Direct-to-disc eliminates the tape recorder to insure maximum dynamic range, wide frequency response, minimum distortion and lowest surface noise. Alan Penchansky was impressed. You will be too!

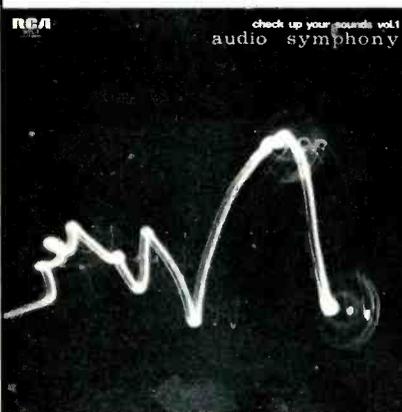
**StandardDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-8  
33 Shiawassee Ave., Fairlawn, Ohio 44313

"The very excellence of sound on this most intriguing album may work to defeat its purpose—to evaluate equipment by ear alone."

Alan Penchansky, Audiophile Recordings Column, *Billboard*, 3/11/78



RVL-1 \$14.95

If the review doesn't convince you, the sound will. This recording, cut from 30 IPS tape masters, is specially composed to test the capabilities of your stereo system.

Included are demo cuts of individual instruments and a 16 page book with score excerpts. An expert was impressed. You will be too!

**StandardDisc**  
INTERNATIONAL REFERENCE SERIES

If not available locally, write for ordering information and current catalog.

Audio-Technica U.S., Inc., Dept. 128A-7  
33 Shiawassee Ave., Fairlawn, Ohio 44313

playing the guitar. I'm looking' right at a meter. And when Mary sings she's lookin' at the meter. I'm watching that meter all the time so that I don't overshoot or undershoot — that I keep the level up. I pick softer, I pick louder." So the limiter came about in the '50s — late '50s, 'bout '58 — something like that.

**PL:** Can you restate here one aspect of your philosophy on recording — the feeling over technical perfection?

**LP:** Well, I think that they're getting to a point of demanding more and more and more . . . I'm judging this from my sons as engineers, and others that are engineers close to me that grew up same age as my son — all of the people surrounding me. The longer they're in the business, they have a tendency to simplify. They find there's no reason just because that knob is there to use it.

**BR:** Well, I think that Paul is referring to is something you said earlier, when you said if you have a choice between technical excellence and feeling, go for feeling every time.

**LP:** Every time. If that's what you mean, yes, yes. The feeling is so much more important than it is to be an excellent . . . Perfection is a disease, and it's something that . . . Be aware if you happen to be of my nature. Anybody that happens to be a person that wants something as close to perfect as you can get — and that is dealing with frequency response and distortion and so on, tape machine, and slowing down the tempo and so forth and so on — you gotta be careful, 'cause you can lose your perspective quickly with one glass of beer. You can go out and come back an hour later and say "I can't believe what I just thought was good." And you've only had a dinner, a couple beers and come back. And you know when I see 'em doing all this automation . . . I say "They're gonna hate themselves in the morning. Tomorrow's another day."

I'll be darned, I can't help but think of my son — he made *Killing Me Softly*. And he brought a test over to my house. And listened to it and I says "Well, you blew it there" and he says "Yeah, well, I'll correct that tomorrow. And I says "Well, that . . . that over there" . . . you should have done that" and he says "Yeah, you're right — that's not too slick there." He got back the next morning, they were *pressing* it already! (LAUGHTER). And he won the Grammy on it! He won the Grammy! Did Tommy Dowd tell you that?

**PL:** No, but I know that sort of thing does go on — you'd better watch your mixes or . . . they'll make a record out of it.

**LP:** The feeling was there. You see. Now, you get guys that are doin' all this stuff. . . and I pull back. They say "What's the matter, Pop, aren't you with it?" And it's hard to screw my head onto their body. Very difficult. And they may be right, I may be right. . . Lot of times they'll say "Well, now you gotta look into what's happening now." Like I jokingly said "If you oversleep one hour, you're out of the ballgame." Because today is moving so fast. If you oversleep one hour, you are now out of the business. You are out of track with the whole field and it's a lost game. So when you look at just that new automated board down there. . . that's the top of the board. To run the top of that board is one man. Now, there has to be a man that can go underneath that board — that's another man. There has to be another man that built that board. Or men. The three of 'em. Now there's a producer sittin' over there, and there's an arranger sittin' next to him. Then there's the performer. And then there's the angel — the guy that says it ain't commercial. And usually that cat is sittin' there like the sultan, and he's listening to this thing and he's saying "Get rid of it. It won't sell."

So there's a lot of facets to this thing. The top of that board is fantastic all by itself. And it's not like the old days where if it doesn't run right, you lift up, you go inside, and you fix it yourself. As I told my kids many years ago, I said "If I ever catch you kids with your hands in that board, I'll kill you. Stay out of it. You're an audio engineer and remember don't go under that board. Because it's frightening what's under there." It's another world. There's few. . . Tommy Dowd is one of 'em that can go under the board and on top of the board . . . I would venture to say that Bill Robinson's not very anxious to go on top of today's board. And me, I can't cancel out many years of goin' on top of that board except for my own study. So when I go on top of that board, it's very simple. If I do Benny Goodman tomorrow, it's gonna be very simple. I do Crosby. . . Crosby actually said "How're you gonna make the next record?" I said "Simple. With no mixer. No nothin'. I'm gettin' an AG-440 and I bring the guys up. We do it in your living room. I take the tape under my arm and kiss you goodbye. That's it." "Hey," he says, "that's something. But I said "Nothing. Nothing! Don't need no engineers, don't need nothing. Just four mikes, four tracks, four people. The guitar player and bass plug in, go. That's it, that's the end. Bing sings, we talk, we do our thing, gone." A

# For about \$15 you can buy the only total record care system or something less.

You have a choice. You can buy a fancy handled record cleaner. Or, for about the same money, you can have the only total record care system there is.

That is, our new Sound Guard™ record cleaner and our famous Sound Guard® record preservative. Both in one package.

The Sound Guard™ Total Record Care System.

With it, you do more than clean everything off your favorite records from dust particles to oily fingerprints.

You actually protect your record's life with a microscopically thin, dust-resistant patented lubricant.

If you want the most for your \$15\* (and

the best for your records), you have to have the only total record care system there is.

Like all Sound Guard products, the Sound Guard Total Record Care System is sold in audio and record outlets.

\*Suggested retail price.



## Sound Guard® keeps your good sounds sounding good.



Sound Guard preservative — Sound Guard cleaner — Sound Guard Total Record Care System  
Sound Guard is Ball Corporation's registered trademark. Copyright © Ball Corporation, 1978. Muncie, IN 47302

# Equipment Directory Addenda

62

The new Uher distributor for the Eastern United States is Saul Mineroff Electronics, 946 Downing Rd., Valley Stream, NY 11580. The West Coast distributor remains Walter Odemer Co.

The Advent/2 loudspeaker weighs 18.5 lbs. and the price is \$81.00.

The proper models for the Chartwell speakers should have been: LS3/5A, PM-100, PM-200, PM-400, and PM-450.

The proper model numbers for the Sansui speakers were: SP-X 9000, SP-X 8000, SP-X 7000, SP-X 6000, SP-A 3100, SP-A 2100, and SP-A 1100. The cross-

over frequencies for the SP-X 9000 and the SP-X 8000 are: 1k, 6k, and 10k.

The price of the Sansui SC-2100 cassette deck is \$400.00, and there are no mike mixing inputs on this unit.

There were several updates for the listings under Shure. The SME 3009 Series III tonearm is 11¼ in. long and can handle a cartridge weight up to 12 grams. The SME 3009/S2 and SME 3009 Series II tonearms both measure 11¼ in. and have a cartridge weight range from 4 to 9 grams. The SR116B and SR112B loudspeakers both have an SPL

sensitivity of 97 dB. The new prices for Shure phono cartridges and the replacement styli are V15 Type III, \$95.00, \$34.00; M24H, \$88.50, \$33.80; M95ED, \$77.50, \$31.50; M95EJ, \$61.95, \$25.95; M91ED, \$66.95, \$28.50; M75ED, \$66.95, \$28.50, and M93E, \$51.50, \$21.80. The new prices for equalizers are M610, \$164.50, and SR107, \$275.00.

The correct address for R. Allen Waech is 2614 N. 68th St., Milwaukee, WI 53213.

## Directory of Manufacturers

### Audio Technology

1169 Tower Road  
Schaumburg, IL 60195

### BGW Systems, Inc.

13130 S. Yukon Ave.  
Hawthorne, CA 90250

### Harold Beveridge, Inc.

505 E. Montecito St.  
Santa Barbara, CA 93103

### R.T. Bozak

P.O. Box 1166  
Darien, CT 06820

### Burhoe Acoustics

78 Stone Place  
Melrose, MA 02176

### Concertaudio

80 George St.  
Paterson, NJ 07503

### DFS

12729 N.E. Whitaker Way

Portland, OR 97230

### Dennesen Electrostatic

P.O. Box 51  
Beverly, MA 01915

### EMT

See: Gotham Audio  
**Electro Research Marketing**  
20727 Dearborn St.  
Chatsworth, CA 91311

### Essence

5500 Old Cheney Rd.  
Lincoln, NE 68506

### General Sound

2334 N. 32nd St.  
Phoenix, AZ 85010

### Gotham Audio

741 Washington St.  
New York, NY 10014

### H and H International

354 State St.

Rochester, NY 14608

### Neumann

See: Gotham Audio  
**Norlin Music**

7373 N. Cicero Ave.  
Lincolnwood, IL 60646

### PSU

2535 Durango Drive  
Colorado Springs, CO 80910

### Pearl

See: Norlin Music  
**Quantum Electronics**

300 Audubon Pkwy., No. 80  
Syracuse, NY 13224

### Ram Audio Systems

17 Jansen St.  
Danbury, CT 06810

### Sansui Electronics

55-11 Queens Blvd.  
Woodside, NY 11377

### Shure Bros.

222 Hartrey Ave.  
Evanston, IL 60204

### Signet Div.

A.T.U.S., Inc.  
33 Shiawassee Ave.  
Fairlawn, OH 44313

### SpeakerKit

P.O. Box 12  
Menomonie, WI 54751

### Willie Studer America

1819 Broadway  
Nashville, TN 37203

### Synergistic Sound Systems

1608 S. Douglas Ave.  
Loveland, CO 80537

### Systems Magnetic

2837 Coronado St.  
Anaheim, CA 92806

# Phono Cartridges



Signet Mk112E

MANUFACTURER	Model	Frequency response, Hz to kHz, ±dB		Channel separ., 1kHz, dB		Channel separ., 10kHz, dB		mV output, 1 kHz, 5 cm/Sec. rms lateral Velocity		Recommended tracking force range, gms.	Recommended load impedance, ohms	Recommended load capacitance, pF	Stylus type—use code	Stylus radius (radial), mils	Is stylus user or factory replaced?	Weight, gms.	Price	Replacement stylus price	Notes
		Hz to kHz	±dB	1kHz, dB	10kHz, dB	mV	cm/Sec. rms lateral Velocity												
EMT (see Gotham)	XSD-15		25		0.75	2.5	800		C	0.6	Fact.	21	435.00	150.00				Repair/exchange units avail.	
FIDELITY RESEARCH	FR-1Mk3F	10-40k	26	24	0.14	2.0			E		Fact.	10	230.00	115.00				All units moving coil. FRT-3, FRT-4 x-formers opt.	
	FR-1Mk7	10-45k	28	20	0.2	2.5			E		Fact.	† 30	660.00	400.00				† Comes w/headshell.	
	FR-1Mk2	20-20k, ±1	25	20	0.1	1½-2.1			E	0.2 x 0.8	Fact.	10	150.00	75.00					
RAM AUDIO SYSTEMS	Ram 9210SG	20-20, ±1	20	17		2	50k		E	0.08 x 0.75	User	3.8	299.00	35.00					
SIGNET	TK5E	10-30	25	20	4.2	¾-1¾	47k	200	E	0.2 x 0.7	User	6.8	85.00	50.00				Moving-coil type. † inc. integrated headshell. Moving coil type.	
	TK7E	5-30	30	22	2.7	¾-1¾	47k	200	E	0.2 x 0.7	User	6.8	150.00	75.00					
	TK7SU	5-45	30	23	2.7	¾-1¾	47k	200	Q	0.2 x 0.7	User	6.8	175.00	100.00					
	MK111E	5-50	30	20	0.4	1-2			E	0.2 x 0.7	Fact.	4.8	275.00	110.00					
	MK112E	5-50	30	20	0.4	1-2			E	0.2 x 0.7	Fact.	15 †	300.00	120.00					
SUPEX (SUMIKO)	SD-900E+ Super	10-50, ±3	30	27	0.2	1.2-1.7			E	0.3x0.8	Fact.	8	200.00	100.00				Moving-coil type, needs transformer. SDT-722. Hi-output moving coil, needs no transformer.	
	SD-901E+ Super	10-35, ±3	30	27	2.0	1.2-1.7	47k		E	0.3x0.8	Fact.	9	175.00	87.50					



BGW 203

# Preamplifiers

MANUFACTURER	Model	Type or Unit — KT-4K, Wired w/ Tube T; Phono Stage Only 2-Mono M	Frequency Response, Hz to kHz		Maximum Output, V	% THD	% W/F IM Distortion	S/N, :1 w/d. phono re: 5 mV input, dB	Phono Sensitivity, mV	Phono Overload, mV	Phono Input Impedance, ohms	High Level Sensitivity, V	Tone Control	Dimensions, to nearest quarter inch, W x D x H	Weight, Lbs.	Price	Notes
			Hz to kHz	± dB													
AUDIO TECHNOLOGY	440	P	20-20k +0,-0.2	14	0.005	0.005	85	0.1-2.0†	140	100-100k ††	No		7½ x 5½ x 1¾	2	189.00	† User adj. gain, 6 steps; †† user adj. resis. & cap. loading, 10 steps. Pre-preamp & RIAA for MC/MM carts. W. clip. LED, subsonic filter.	
BGW	103		20-20k ±0.25	8	0.01	0.01	82	2.0	100	47k	0.20	Yes	19 x 10½ x 3½	13½	399.00	Variable cartridge loading.	
	203		20-20k ±0.2	8	0.01	0.01	82	1.5	100	47k	0.20	Yes	19 x 11¼ x 5¼	18½	649.00		
BOZAK	909		20-20k +0.25		0.1	0.1	85	2.5	120		0.26		17¾ x 5½ x 6½	21	450.00	EQ tape out; 2 phono inputs	
	912		20-20k +0.25		0.1	0.1	82	2.0	120		0.08		17¾ x 7 x 10¼	28	800.00	Mixable inputs; 3-band EQ w. var. turnover; indep. cue circuit; slide controls.	
QUANTUM ELECTRONICS	CP-1		1-225 -1 +1	15	0.01	0.01 †	76	0.45	150	50k	0.05	No	14½ x 3½ x 7¼	15	895.00	† SMPTE method. w. CP-1PS power supply.	
	MCP-1		2.5-100 +0-1	1.5	0.01 ††	0.01 ††	87 ††	0.078 ††	250	20k		No	7¼ x 3½ x 7¼	3		† SMPTE method. †† When used with CP-1. Moving coil pre-preamplifier. Requires CP-1PS power supply or phantom power off CP-1.	
RAM AUDIO SYSTEMS	Ram-200		5-30 ±0.1	10	0.02	0.02	80	0.25/14	300	†	0.25	No	17 x 3½ x 14	25	1050.00	† Selectable, 6-78k.	
	Ram-203		20-20 ±0.2	8	0.01	0.01	70	2.5/25	300	†	0.25	Yes	15 x 3½ x 8	15	290.00	† 47k or 68k.	
	Dep-233		5-35 ±0.1	15	0.02	0.02	85	0.25/14	300	†	0.25	No	15 x 3½ x 12	20	597.00	† Selectable, 6-10k, Dual mono, Passive RIAA EQ.	

# Open-Reel Tape Decks

MANUFACTURER	Model	Speeds — See letter code	Maximum reel size, inches	Number of heads	Number of tracks	Number of channels	Number of motors	Drive motor type	Drive to capstan	Freq. resp. Hz-KHz	S/N, db	Wow & Flutter, DIN 45-507, %	Output level at 0 VU, mV	Dolby N/P included	Mike mixing	Mike input Z, ohms	Record level indicator(s), Type and quantity	Dimensions, inches, W x H x D	Weight, lbs.	Price, \$	Notes																			
																						Letter Code For Speeds																		
																					A	B	C	D	E	F	G	H												
																					15					x	x	x												
																					7 1/2	x	x	x	x	x	x	x												
																					3 3/4	x	x	x	x	x	x	x												
																					1 1/2	x	x	x	x	x	x	x												
																					15																			
																					15																			
REVOX (STUDER)	B77	B	10 1/2	3	2, 4	2	3	Asyn.		30-20 +2, -3	0.08	66	†	yes	50-600	2 mtrs.	17 1/2 x 18 1/4 x 8 1/4	37 1/2	1499.00	† Dolby optional.																				
	A77	B	10 1/2	3	2, 4	2	3	Asyn.		30-20 +2, -3	0.08	66	†	yes	50-600	2 mtrs.	18 1/2 x 14 1/4 x 7 1/4	34	1249.00																					
	A700	E	10 1/2	3	2, 4	2	3	Asyn.		30-22 +2, -3	0.06	65	No	yes	50-600	2 mtrs.	19 x 18 1/4 x 7	53	2999.00																					



Shure SM81

# Microphones

MANUFACTURER	Model	Directional Pattern	Operating Principle	Case Material	Response tailored For	Impedance, ohms	Frequency Range, Hz to kHz	EIA Sensitivity, dBm	Mike Connection	Cable length, feet	Cable plug type	Dimensions, inches, length x diameter	Weight, ounces	Mounting Method	Price, \$	Notes	
NEUMANN (GOTHAM)	KM-84	Cardioid	Cond.	Metal		200	40-20	-137	XLR 3			1 x 4 1/2	3	3/8 x 27	298.00		
	U-87	Omni. Card., Fig. 8	Cond.	Metal		150/250	40-16	-137	XLR 3	25	XLR 3	8 x 2 1/4	20	3/8 x 27	890.00		
	U-47 fet	Cardioid	Cond.	Metal		250/200	40-16	-137	XLR 3	25	XLR 3	6 1/4 x 2 1/4	24 1/2	3/8 x 27	833.00		
	KM-86	Omni. Card., Fig. 8	Cond.	Metal		200	40-20	-140	XLR 3	25	XLR 3	7 1/4 x 1 3/4	7 1/4	3/8 x 27	871.00		
	SM-69 fet	Omni. Card., Fig. 8	Cond.	Metal		200	40-16	-140	Tuchel	33	XLR 3	10 x 2	16	3/8 x 27	2229.00		
	OM-69	†	Cond.	Metal		200	40-16	-140	Tuchel	33	XLR 3	11 1/2 x 1 1/2 x 2	16	3/8 x 27	2303.00	† Quadraphonic, four-pattern mike.	
	KM-88	Omni. Card., Fig. 8	Cond.	Metal		200	40-16	-138	XLR 3	25	XLR 3	6 x 1	3 1/2	3/8 x 27	871.00		
	KM-83	Omni	Cond.	Metal		200	40-20	-137	XLR 3				4 1/4 x 1	3	3/8 x 27	298.00	
	KM-85	Cardioid	Cond.	Metal		200	40-20	-137	XLR 3				4 1/4 x 1	3	3/8 x 27	298.00	
	KMS-84	Cardioid	Cond.	Metal		200	40-16	-137	XLR 3	25	XLR 3	8 1/4 x 1 1/2	10 1/2	3/8 x 27	811.00		
KMA	Omni	Cond.	Metal		200	40-16	-137	attach				1 1/4 x 3/4	2	clip	348.00		
KU-801	†	Cond.	Metal		200	40-16	-137	Tuchel			XLR 3		160		2440.00	† Rubber "human" head w/mikes at ears for binaural recording.	
SHURE	516EO	Cardioid	Dynamic	Zinc		150	50-15	-153	Swcft. A3F	15	Phone	6 1/4 x 1 1/2	9 1/2	3/8 x 27	91.80	\$165.00 per pair.	
	545SD	Cardioid	Dynamic	Zinc	Vocal	150/45k	50-15	-149	Swcft. A3F	15	Not Furn.	6 1/4 x 1 1/4	9	3/8 x 27	87.60	On-off switch.	
	565SD	Cardioid	Dynamic	Zinc	Vocal	150/45k	50-15	-148	Swcft. A3F	15	Not Furn.	6 1/4 x 2	10 1/2	3/8 x 27	97.20	On-off switch.	
	589S	Cardioid	Dynamic	Zinc	Vocal	150/30k	90-13	-155	Swcft. A3F	15	Not Furn.	7 x 1 1/2	12	3/8 x 27	66.60	On-off switch.	
	SM57	Cardioid	Dynamic	Zinc	Instr. & Vocal	38/150	40-15	-148	Swcft. A3F	20	Not Furn.	6 1/4 x 1 1/4	10	3/8 x 27	108.00		
	SM58	Cardioid	Dynamic	Zinc/Alum	Instr. & Vocal	38/150	50-15	-148	Swcft. A3F	20	Not Furn.	6 1/4 x 2	15	3/8 x 27	138.00		
	SM59	Cardioid	Dynamic	Alum	Instr. & Vocal	150	50-15	-155	Swcft. A3F	20	Swcft. A3M	7 3/4 x 1 3/4	7.6	3/8 x 27	144.00	Hum-bucking coil. w. shock mount.	
	SM81	Cardioid	Elect. Cond.	Steel	Vocal Prof. Rec.	150	20-20	-136	Swcft. A3F	25	Swcft. A3M	8 1/2 x 1	8	3/8 x 27	225.00	Two-position roll-off.	
PEARL (NORLIN)	CM 1000	Uni	Cond.	Metal		600	50-14	-68		16 1/2	phone	7 1/2 x 1 1/4	5		45.95		
	CM 2000	Uni	Cond.	Metal	strings	600	40-15	-68	Cannon	16 1/2	phone	7 1/4 x 1	4		65.95		
	CM 3000	Uni	Cond.	Metal	strings	600	30-16	-68	Cannon	20	phone	8 x 1 3/4	5		71.95		
	CM 4000	Uni	Cond.	Metal	strings	600	30-16	-68	Cannon	20	Cannon	6 1/4 x 2	10		81.95		
	CM 5000	Uni	Cond.	Metal	strings	600	30-16	-68	Cannon	20	Cannon	7 1/2 x 2	8		86.95		
	DM 7000	Uni	Dynamic	Metal	vocal	200	50-16	-73	Cannon	20	Cannon	6 1/2 x 2	9		105.95		
	DM 7500	Uni	Dynamic	Metal	Vocal, Bass	200	50-16	-73	Cannon	20	Cannon	7 1/2 x 2	7		119.95		
	DM 9000	Uni	Dynamic	Metal	Vocal, Bass	200	15-16	-73	Cannon	20	Cannon	7 1/2 x 1 1/2	7		139.95		
SANSUI	DM-11	Cardioid	Dynamic	Alum		600	100-15	-154	5P	20	phone	6 1/2 x 2	9.9	3/8 x 27	110.00		
	EM-1	Cardioid	Elect.	Alum.		600	50-15	-149	Integ.	20	phone	7 3/4 x 1 1/4	3.6	3/8 x 27	80.00	W. 3 windscreens.	



# Tonearms

MANUFACTURER	Model	Overall Length, inches	Pivot-Stylus Distance, inches	Cueing	Damped Cueing	Maximum Tracking Error, degrees/inch	Anti-Skating Adjustment	Tracking Force Range, gms.	Total Cable Capacitance, pF.	Cartridge Weight Range, gms.	Vertical Bearing Type	Lateral Bearing Type	Price	Notes
FIDELITY RESEARCH	FR-12	11.5	9.1	Yes	Yes	2.0	Yes	0-3	80	4-12	Ball	Ball	400.00	
	FR-14	12.5	9.6	Yes	Yes	2.0	Yes	0-3	80	4-12	Ball	Ball	400.00	
	FR-64a	12.7	9.6	Yes	Yes	1.0	Yes	0-5	80	0-24	Ball	Ball	600.00	
	FR-66a	15.1	12.1	Yes	Yes	1.0	Yes	0-5	80	0-18.7	Ball	Ball	1250.00	

# Headphones

Signet TK33



MANUFACTURER	Model	Operating principle (dynamic, electrostatic, etc.)	Frequency Range, HZ to kHz	Impedance, ohms	Sensitivity, dB SPL for 1 mV input	Maximum input, mV	Cord Length, feet	% THD at 95 dB SPL	Cord Style Flat — F Coiled — C	Weight, ounces	Price	Notes
SIGNET	TK22	DYN	20-20	4-16	96	250	12	0.4	F	9.2	80.00	FXD Magneta Bi-polar Design † 100 dB at 1 V.
	TK33	Elect.	10-22.5	4-16	†	10,000	8.2	0.1	F	10	250.00	

# Loudspeakers

MANUFACTURER	Model	Enclosure type	Woofer dia., inches	Midrange dia., inches	Midrange type	Tweeter dia., inches	Tweeter Type	Level controls, W = woofer M = midrange, T = tweeter, ST = super tweeter	Anechoic freq. response Hz to kHz, ± dB	Recommended min. amp. power	Crossover frequencies, Hz.	Impedance, ohms: Nominal/minimum	Dimensions, inches	Finish	Grille Material Color	Weight, lbs.	Price \$ (Noted if per pair.)	Notes	
ADVENT	Advent/3	Ac. Sus.	8½			1½	Cone		85	10	1.5k	8/6	9½ x 6½ x 15½	vin. wal.	cloth	10.8	57.00		
BEVERIDGE	2SW-1	Line Source	12		E.S.		E.S.		25-18 ±2		90		24 x 15 x 78	oil. wal.	foam blk.	360	7000.00	W/biamp, elec. x-over, & subwoofer.	
	Bev. Jr.	Line Source	10		E.S.		E.S.		35-18 ±2		50	200	8	17 dia. x 72	oil. wal.	foam blk.	140	2000.00	
BOZAK	CS-310B/CS-410	Inf. baf.	(4) 12	(2) 6	Cone	(8) 2	Cone		28-20		60	400, 2.5k	8	36 x 19 x 52	oil. wal.	cloth wh.	225	1375.00	
	CS-4000/CS-4005	Inf. baf.	(2) 12	6	Cone	(8) 2	Cone		35-20		50	400, 2.5k	8	27 x 16 x 44	oil. wal.	cloth brn/wh	190	860.00	CS-4005 LoBoy.
	CS-501	Inf. baf.	12	6	Cone	(3) 2	Cone	M	40-20		15	400, 2.5k	8	20 x 16 x 32	oil. wal.	cloth brn	90	450.00	
	LS-400	Inf. baf.	12	6	Cone	(2) 2	Cone	T	40-20		20	800, 2.5k	8	18 x 13 x 25	oil. wal.	cloth brn.	65	300.00	
	LS-300	Vented	8	4	Cone	2	Cone		32-18 ±3		15	325, 3.2k	4	17 x 12½ x 6½	†	cloth blk	66	250.00	† Wal, teak, or ebony.
	LS-250	Sealed	12	4	Cone	2	Cone	T	45-20		20	800, 2.5k	8	15 x 12 x 23	vin. wal.	cloth brn	48	195.00	
	LS-200	Vented	6			2	Cone		45-20		20	2k	8	12 x 11 x 20	vin. wal.	cloth brn	34	110.00	
	B-1002	Inf. baf.	8			2	Cone		50-20		12	2k	8	16 x 21 x 12	white	gold mesh	25	159.00	Weather-proof. Rear spkr for time delay.
DS-1207	Inf. baf.	12		(2) 2		Cone	T	45-20		20	2k	8	15 x 15 x 30	oil. wal.	cloth brn.	60	215.00	As above.	
DS-1800	Vented	8						44-12		15		8	13 x 13 x 21	vin. wal.	cloth brn.	40	110.00		
BURHOE ACOUSTICS	Crimson	Tuned Port	4			1	Dome			89	3k	8	13 x 8½ x 7½	vin.	foam blk.	12½			
	Green	Tuned Port	8			1½	Dome			93	2k	8	22 x 13½ x 10	vin.	foam blk.	25			
	White	Tuned Port	8			1	Dome			90	1.5k	8	13½ x 22 x 10	wal.	foam blk.	34			

# Loudspeakers

MANUFACTURER	Model	Enclosure type	Woofer dia., inches	Midrange dia., inches	Midrange type	Tweeter dia., inches	Tweeter Type	Level controls: W=woofer, M=midrange, L= Tweeter, ST=super-tweeter	Anechoic freq. response Hz to kHz, ± dB	dB SPL (watt/meter)	Recommended min. amp. power	Crossover frequencies, Hz	Impedance Ohms Nominal/minimum	Dimensions, inches	Finish	Grille Material Color	Weight, lbs.	Price \$ (Noted if per pair.)	Notes
BURHOE ACOUSTICS (continued)	Light Blue	Tuned Port	10			1½	Dome		94	1.5k	8	24¼ x 14¼ x 10¼	vin.	foam blk.	40				
	Blue	Tuned Port	10	1½	Dome	1	Dome		92	1&2k	8	24¼ x 14¼ x 10¼	wal.	foam blk.	42				
	Silver	Tuned Port	10	1½	Dome	1	Dome		93	1&2k	8	31½ x 23 x 10½	wal.	cloth blk.	65				
CONCERTAUDIO	Generation I	Inf. baf	(2) 15			1½			40-16.5	100	800, 5k	8/3	36 x 20 x 24	Wood	cloth blk.	200	1599.00		
	Generation IV	Inf. baf	(2) 15			1½			40-13.5	100	3k	8/4	36 x 20 x 24	Wood	cloth blk.	175	1199.00		
DFS	JJ	Ac. Sus.	8			2½	Cone		62-18 ±5	5	2k	8/5.8	16 x 11 x 8	Ven. wal.	cloth blk.		80.00		
	J1	Ac. Sus.	8			2½	Cone		55-18 ±5	15	2k	8/5.8	20 x 12 x 10	ven. wal.	cloth blk.		115.00		
	J-2a	Ac. Sus.	10			2½	Cone		50-18 ±5	15	2k	8/4.9	24 x 13 x 12	ven. wal.	cloth blk.		137.00		
	J-3	Ac. Sus.	(2) 8			(3) 2½	Cone		45-18 ±5	15	2k	4/3	27 x 14 x 12	ven. wal.	cloth blk.		200.00		
	T-4	Ac. Sus.	(2) 8	5	Cone	(2) 2½	Cone		40-18 ±5	20	1.5, 5k	4/3	36 x 13 x 12	ven. wal.	cloth blk.		225.00		
	T-5	Ac. Sus.	8&10	5	Cone	(2) 2½	Cone		38-18 ±4	25	100, 1&5k	4/3	37 x 14 x 12	ven. wal.	cloth blk.		312.50		
	T-6	Tuned	12	4	Cone	1½	Dome	M, T	17-22	40	500, 3&7k	8/4.3	40 x 15 x 14	ven. wal.	cloth blk.		525.00		
DENNESEN	ESL-2					(8)	E.S.			3.5 or 4.5			11 x 16 x 6		foam		120.00	Add-on tweeter.	
	ESL-180		8				E.S.			1.5k			21½ x 13½ x 9½		foam		220.00		
	ESL-360		10	2	Dome		E.S.						28 x 16 x 16	vin. wal.	foam		450.00		
GENERAL SOUND	Micron 630	Ac. Sus.	6	2	cane	1	dome			12		8/6	7½ x 7 x 11¼	oil. wal.	Cloth, var.	16	200.00	W/"Time Align." Inc. crossover for satellites.	
	Micron 1011	Tun. Port	10							40	100	8/6	20 x 20 x 19	oil. wal.	Cloth, brn.		300.00		
	Micron 420	Ac. Sus.	4			1	dome					8/6	5 x 5 x 7½	oil. wal.	Cloth, var.	8	125.00	W/"Time Align." As above.	
	Micron 520	Ac. Sus.	5¼			1	dome					6/4	6 x 6 x 9	oil. wal.	Cloth, var.	10	150.00		
JR (HAND H INTERNATIONAL)	JR 149	Ac. Sus.	5¼			¾	Dome		55-20 ±4	30	3k	8/5	9-in. dia x 14½	Var.	foam brn.	12	475.00 pair		
SPEAKERKIT	Model One	Ac. Sus.	5			1	Dome		70-22 ±3	91	10	2.5k	8	10½ x 7 x 5¼	Opt	Cloth, Brown	7	39.00	
	Model Two	Ac. Sus.	8			1¼	Dome	T	55-22 ±3	91	10	2.5k	8	18 x 11¼ x 10	Opt	Cloth, Brown	30	49.00	
	Model Three	Ac. Sus.	10			1¼	Dome	T	40-22 ±3	91	10	2.5k	8	23½ x 15¼ x 12½	Opt	Cloth, Brown	49	60.00	
	Model Four	Ac. Sus.	10	1½	Dome	1	Dome	M, T	40-22 ±3	91	10	850, 4k	8	23½ x 15¼ x 12½	Opt	Cloth, Brown	52	88.00	
	Model Five	Ac. Sus.	12	1½	Dome	1	Dome	M, T	32-22 ±3	91	15	850, 4k	8	28 x 16¼ x 12½	Opt	Cloth, Brown	65	99.00	
	Model Six	Pas. Rad.	12	5 1½	Cone Dome	1	Dome	M, T	28-22 ±3	91	15	400, 1.3k, 4k	8	43¼ x 16¼ x 12½	Opt	Cloth, Brown			Optional Ultra tweeter \$20.00.
	Model Seven	Ac. Sus.	(2) 10						30-125	91	10	125	8	22 x 24 x 12½	Opt	Cloth, Brown	73	73.00	Infra-woofer use with Model One
	Model Eight	Trans. Line	10	5 1½	Cone Dome	1	Dome	M, T	30-22 ±3	91	10	400, 1.3k, 4k	8	35 x 18 x 15½	Opt	Cloth, Brown	92	115.00	Optional Ultra tweeter \$20.00.
	Model Nine	Ac. Sus.	12	1½	Dome	1	Horn	M, T	32-15 ±3	91	15	850, 4k	8	28 x 16¼ x 12½	Opt	Cloth, Brown	65	124.00	
	Model Ten	Ac. Sus.	12	2	Horn	1	Horn	M, T	32-15 ±3	91	15	850, 4k	8	28 x 16¼ x 12½	Opt	Cloth, Brown	69	181.00	
	Model Eleven	Pas. Rad.	12	2	Horn	1	Horn	M, T	28-15 ±3	91	15	850, 4k	8	43½ x 16¼ x 18	Opt	Cloth, Brown	89	193.00	
	Model Twelve	Tuned Port	15	2	Horn	1	Horn	M, T	34-15 ±6	103	5	850, 4k	8	57 x 36 x 18	Opt	Cloth, Brown	110	265.00	
SYSTEMS MAGNETIC	SMC-15	Ported	15						30-16	104		800	8	32½ x 26¼ x 19¼	oil. wal.	cloth blk.	125	675.00	
	SMC-10-2	Ported	10						40-16	100		800	8	33½ x 21 x 13½	oil. wal.	cloth blk.	86¼	645.00	
	SMC-10	Ported	10						45-16	97		800	8	21 x 21 x 15	oil. wal.	cloth blk.	58	525.00	

# CAR STEREO ADDENDA

## Manufacturers

**ADS**  
One Progress Way  
Wilmington, MA 01887

**Acoustic Fiber Sound Systems**  
P.O. Box 50829  
Indianapolis, IN 46250

**Audioanalyst**  
P.O. Box 262  
Brookfield, CT 06804

**Audiotex**  
400 S. Wyman St.  
Rockford, IL 61101

**Avanti**  
See: Audiotex

**BP Electronics**  
855 Conklin Rd.  
Farmingdale, NY 11735

**Draco Labs**  
1005 Washington St.  
Grafton, WI 53024

**Jensen Sound Labs**  
4136 N. United Pkwy  
Schiller Park, IL 60176

**Matrecs**  
See: Audiotex

**Motorola**  
1299 E. Algonquin Rd.  
Schaumburg, IL 60196

**Nakamichi**  
220 Westbury Ave.  
Carle Place, NY 11514

**Pyramid Industries**  
12970-7N Branford St.  
Arleta, CA 91311

**Road Sounds**  
See: Suntron

**Sanyo Electric**  
P.O. Box 5177  
Compton, CA 90220

**Suntron, Inc.**  
425 7th St., N.W.  
Washington, D.C. 20004

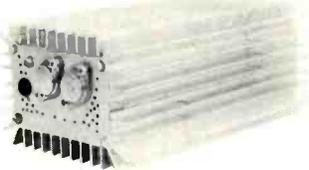
An error crept into the July, 1978, test of the Sanyo FT-1490A AM/FM cassette player. It seems that a phantom ground showed up on the Sound Technology 1200A test panel, whereas the speaker connections of the Sanyo unit must be totally isolated from ground, as they would be in a normal car installation using two leads to each speaker. As a result, we reported a

power output of only 2.03 watts per channel across 4-ohm loads. Sanyo's engineers contacted us and assured us that we were "doing something wrong," and so Len Feldman rechecked his results. Made aware of the grounding problem, he isolated the unit under test from the test panel and used a completely separate load and voltmeter. Sure enough, the unit now

produced 10 volts across an 8-ohm load (per channel), or approximately 12.6 volts per channel for a nominal 5 per cent THD. We offer our sincere apologies to Sanyo and our readers for this goof.

The new address for Fosgate Electronics is 2925 N. 33rd Ave., Phoenix, AZ 85017.

68



Draco db-90



Sanyo FT-1679



Jensen R430



Nakamichi 250

## Car Radio/Tape Players

MANUFACTURER	Model	Price	Stereo (S), Mono (M), or 4-channels (C)	FM Sensitivity, uV (for 3-dB quieting)	Selectivity	Average Watts/channel 52-10 kHz. at 100% Distortion	% Distortion @ rated watts	Local/Distance Switch	Pyrophotonic (Yes)	Number AM, Member FM	Bass Control	Treble Control	Cassette	S-Track	Auto Reverse	Fast Forward	Tape Rewind	In-Dash (I) or Under-Dash (U)	Control Shift Spacing, inches	Dimensions, inches, H x W x D
DRACO	db-30	\$9.95	S		15															5 3/4 x 5 3/4 x 1 3/4
	db-90	169.95	S		45	0.25														9 x 5 1/4 x 4
JENSEN	R430	489.95	S	75	26	0.4	Yes		Yes	Yes	Yes	Yes	No	No	Yes	Yes	I	Adj.	2.7x7x6	
	R420	389.95	S	75	10	1.0	Yes		Yes	Yes	Yes	Yes	No	No	Yes	Yes	I	Adj.	2.7x7x6	
	R410	299.95	S	75	4	1.0	Yes		Yes	Yes	Yes	Yes	No	No	Yes	Yes	I	Adj.	2.7x7x6	
	R330	489.95	S	75	26	0.4	Yes		Yes	Yes	No	Yes	No	No	Yes	No	I	Adj.	2.7x7x6	
	R320	389.95	S	75	10	1.0	Yes		Yes	Yes	No	Yes	No	Yes	No	Yes	I	Adj.	2.7x7x6	
	R310	299.95	S	75	4	1.0	Yes		Yes	Yes	No	Yes	No	Yes	No	Yes	I	Adj.	2.7x7x6	
MOTOROLA	TF850AX	\$99.95	S		4		yes		no	no	no	no	yes	no	no	no	I	Adj.		
	TM428S	\$99.95	S		12		no		no	yes	yes	no	yes	no	no	no	U			
	TM228S	\$69.95	S		4		no		no	yes	yes	no	yes	no	no	no	U			
	TM125S	\$49.95	S		4		no		no	no	no	no	yes	no	no	no	U			
	TC881AX	\$139.95	S		4		yes		no	no	no	yes	no	no	yes	yes	I	adj.		
	TC879AX	\$99.95	S		4		yes		no	no	yes	no	no	yes	yes	I	adj.			
	TF882AX	\$189.95	S		12		yes		5 AM, 5 FM	yes	yes	no	yes	no	no	no	I	adj.		
	TF880AX	\$149.95	S		4		yes		5 AM, 5 FM	no	no	no	yes	no	no	no	I	adj.		
Continued	TC888AX	\$219.95	S		4		yes		5 AM, 5 FM			yes		no	yes	yes	I	adj.		

# Car Radio/Tape Players

MANUFACTURER	Model	Price		Stereo (S), Mono (M), or 2-Channel (C) FM Separability (S)	Selectivity (for 3-DB sideband)	Average Watts (channel, 50% DUTY at rate, Disruption % Disruption @ rated)	Local/Distance Switch	Pushbuttons (If Yes, Number AM, Number FM)	Bass Control	Treble Control	Cassette	B-Track	Auto Reverse	Fast Forward	Tape Rewind	In-Dash (I) or Under-Dash (U)	Control Shaft Spacing, inches	Dimensions, inches, H x W x D	
MOTOROLA (Continued)	TC887AX	\$229.95	S			4	yes	5 AM, 5 FM	no	no	yes	no	yes	yes	yes	I	adj.		
	TC885AX	\$179.95	S			4	yes	5 AM, 5 FM	no	no	yes	no	yes	yes	yes	I	adj.		
	TC883AX	\$169.95	S			4	yes	5 AM, 5 FM	no	no	yes	no	yes	yes	yes	I	adj.		
NAKAMICHI	250	310.00	S						No	No	Yes	No	No	Yes	Yes	U		3 1/2 x 7 1/4 x 9 1/2	
	350	440.00	S						No	No	Yes	No	No	Yes	Yes	U		3 1/2 x 7 1/4 x 9 1/2	
PYRAMID	PMA40	55.00	S			20	1.0												
	PMA80	99.00	S			40	1.0												
	PME-100	89.00	S																
	X-700VL	159.00	S			22	0.5												
	X-1000VL	199.00	S			25	0.5												
SANYO	FT 488R	\$159.95	S	1.5	55	4	3	Yes	No	No	Yes	No	Yes	Yes	Yes	I	Adj.	2 x 7 x 6	
	FT 418	\$159.95	S	1.5	55	4	3	Yes	5 AM or FM	No	Yes	No	No	Yes	Yes	I	Adj.	2 x 7 x 6	
	FT 484R	\$139.95	S	1.5	55	4	3	Yes	No	No	Yes	No	No	Yes	Yes	I	Adj.	2 x 7 x 6	
	FT 117	\$139.95	S	1.5	55	4	3	Yes	5 AM or FM	No	Yes	No	No	Yes	No	I	Adj.	2 x 7 x 6	
	FT 1495	\$219.95	S	1.0	60	14	3	No	5 AM or FM		Yes	No	Yes	Yes	Yes	I	Adj.	3 x 7 x 6	
	FT 1490A	\$199.95	S	1.0	60	14	3	Yes	No	No	Yes	No	Yes	Yes	Yes	I	Adj.	3 x 7 x 6	
	FT 489	\$179.95	S	1.0	60	4	3	Yes	5 AM or FM	No	No	Yes	No	Yes	Yes	I	Adj.	2 x 7 x 6	
	FT 415	\$159.95	S	2.0	60	3.5	3	No	5 AM or FM	No	No	Yes	No	No	Yes	I	Adj.	2 x 7 x 5 1/2	
	FT 874	\$149.95	S	1.5	55	4	3	Yes	5 AM or FM	Yes	Yes	No	Yes	Yes	Yes	I	Adj.	3 x 7 x 6	
	FT 950	\$129.95	S	1.5	55	4	3	Yes	No	Yes	Yes	No	Yes	Yes		I	Adj.	2 x 7 x 5	
	FT 870	\$109.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes		I	Adj.	2 1/4 x 7 x 6	
	FT 869	\$89.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes		I	Adj.	2 x 6 1/4 x 5	
	FT 481	\$109.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes		I	Adj.	2 x 7 x 6	
	FT 479	\$109.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes		I	Adj.	2 x 7 x 6	
	FT 478	\$89.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes		I	Adj.	1 1/2 x 6 1/4 x 4 3/4	
	FT 1877	\$199.55	S	1.0	60	12	3	Yes	5AM or FM	Yes	Yes	No	Yes	No	Yes	I	Adj.	3 x 7 x 6	
	FT 8705/A	\$89.95	S	2.5	55	3.5		Yes	5 AM or FM	No	No	No	No			I	Adj.	2 x 7 x 4 3/4	
	FT 8706	\$79.95	S	2.5	55	3		Yes	5 AM, 5 FM	No	No	No	No			I	Adj.	1 1/2 x 6 1/4 x 4 3/4	
	FT 1679	\$369.95	S	1.0	60	4	3	Yes	5 AM, 5 FM	Yes	Yes	Yes	No	No	Yes	Yes	I	Adj.	3 x 7 x 6
	FT 690	\$299.95	S	1.0	60	4	3	Yes	5AM, 5 FM	No	No	Yes	No	No	Yes	Yes	I	Adj.	3x7x6
	FT 8701A	\$99.95	S	2.0	60	4	3	Yes	5 AM, 5 FM	No	No	No	No	No	No	I	Adj.	2 x 7 1/4 x 6	
	FT 823R	\$54.95	S			4		No	No	No	No	Yes	No	Yes	No	U		2 3/4 x 4 3/4 x 6 1/2	
	FT 817	\$44.95	S		2.5			No	No	No	No	Yes	No	No	No	U		2 3/4 x 4 3/4 x 6 1/2	
	FT 1405	\$139.95	S	1.5	55	12	3	No	No	Yes	Yes	Yes	Yes	Yes	Yes	U		2 1/4 x 6 3/4 x 6 3/4	
	FT 1400	\$119.95	S			12	3	No	No	Yes	Yes	Yes	Yes	Yes	Yes	U		2 1/4 x 7 x 7	
	FT 407	\$109.95	S	2.5	55	4	3	Yes	No	No	No	Yes	No	Yes	Yes	U		2 1/4 x 7 1/4 x 6 1/4	
	FT 406	\$89.95	S			4	3	No	No	No	No	Yes	Yes	Yes	Yes	U		2 x 6 1/2 x 6 1/4	
FT 402R	\$64.95	S		3.5			No	No	No	No	Yes	No	Yes	Yes	U		1 3/4 x 6 3/4 x 5 3/4		
FT 601	\$44.95	S		3			No	No	No	No	Yes	No	Yes	Yes	U		2 x 4 3/4 x 5		
FT 1004	\$139.95	S	1.5	55	12	3	Yes	No	Yes	Yes	No	Yes	No	Yes	U		2 1/4 x 6 3/4 x 6 3/4		
FT 1003	\$119.95	S	2.0	60	8	3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	U		2 3/4 x 7 1/4 x 8		
FT 1002	\$119.95	S			12	3	No	No	Yes	Yes	No	Yes	Yes	No	U		2 1/2 x 7 x 7		
FT 1001A	\$89.95	S			8	3	No	No	Yes	Yes	No	Yes	Yes	No	U		2 3/4 x 7 1/4 x 8		

# Car Speakers

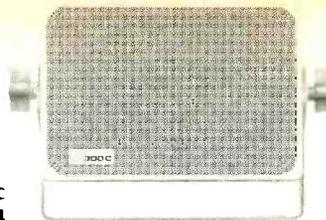
MANUFACTURER	Model	Price, \$ (if sold individually)	Price, \$ (if sold in pairs)	Recommended Power, Watts	Driver Size, inches	Magnet Size, Oz.	Impedance, Ohms	Frequency Response, Hz to kHz, ± dB	Two-way (2) or Three-way (3)	Flush Mount (F) or Surface Mount (S)	Overall Dimensions	Notes
ADS	200C/II	117.50		10	†	4/3.6	55-22k ±5	2	S††	4 1/2 x 4 1/4 x 7		†4-in. woofer & 1-in. dome. ††Flush w/klt.
	300C/II	150.00		10	†	4/3.6	40-22k ±5	2	S	8 1/2 x 6 x 5 1/4		†5 1/4-in. woofer & 1-in. dome.
	2001/II	589.95			†	47k	50-22k ±5	2	S††	4 1/2 x 4 1/4 x 7		†4-in. woofer & 1-in. dome. ††Flush w/klt.
	2002/II	449.95			†	43k, 350k	55-22k ±5	2	S††	4 1/2 x 4 1/4 x 7		160 W rms bi-amplified. †4-in. woofer & 1-in. dome ††As above. 80 W rms bi-amplified.



Pyramid  
PMS-5A



Acoustic  
Fiber 8974



ADS 300C/II



Matrecs MA-0069-20TP

# Car Speakers

MANUFACTURER	Model	Price \$ (if sold individually)	Price \$ (if sold in pairs)	Recommended Power, Watts	Driver Size, Inches	Magnet Size, Oz.	Impedance, Ohms	Frequency Response, Hz to kHz, ± dB	Two-way (2) or Three-way (3)	Fluid Mount (F) or Surface Mount (S)	Overall Dimensions	Notes	
ACOUSTIC FIBER SOUND SYSTEMS	1020	13.95											
	1080	13.95											
	2031	17.50											
	2032	24.60											
	2731	17.95	25	4x10	10	8	55-16k	2	F		7x8x12	CB console w/storage Stereo console w/storage	
	2732	24.60	25	4x10	10	8	55-18k	2	F		7x8x12		
	2731	17.95	25	5x7	10	8	60-16k	2	F		10x4 1/2 x 2 1/4		
	2732	24.95	25	5x7	10	8	60-18k	2	F		10x4 1/2 x 2 1/4		
	2821	14.60	18	8	5	8	85-15k	2	F		7 1/4 x 5 x 2 1/2		
	2831	19.40	30	8	10	8	50-15k	2	F		8x3		
	3025	12.95	5	3 1/2	3	8	200-8k	2	S		8x3		
	3035	17.95	5	3 1/2	3	8	150-10k	2	S		4x5x4 1/4		
	3045	21.95	5	3 1/2	3	8	150-10k	2	S		4 1/4 x 5 1/4 x 4 1/4		
	3055	24.95	7	5	3	8	80-10k	2	S		7x5x5		
	3065	16.95	5	3 1/2	3	8	150-10k	2	F		5 1/2 x 5 1/4 x 4 1/2		
	3085	29.95	5	5	3 1/2	3	150-10k	2	S		6x5 1/2 x 3 1/2		
	4060		17.95										
	6049	39.95	25	5 1/2	10	4/8	60-15k	2	S/F		5 1/2 x 11 x 9 1/2		
	6059	49.95	25	5 1/4	10	4/8	60-20k	2	S/F		5 1/2 x 11 x 9 1/2		
	6069	44.95	36	6x9	10	4/8	50-15k	2	S/F		5 1/2 x 11 x 9 1/2		
	6079	54.95	36	6x9	10	4/8	50-18k	2	S/F		5 1/2 x 11 x 9 1/2		
	7311	22.95	10	3 1/2	3	4/8	80-16k	2	F				
	8231	44.95	12	5 1/4	10	8	55-15k	2	F				
	8232	64.95	12	5 1/4	10	8	55-17.5k	2	F				
8531	44.95	10	5	10	8	65-15k	2	F					
8931	49.95	18	6x9	10	8	45-15k	2	F					
8932	69.95	18	6x9	10	8	45-18k	2	F					
8971	59.95	30	6x9	20	4/8	40-15k	2	F					
8972	79.95	30	6x9	20	8	40-18k	2	F					
8974	109.95	50	6x9	20	4/8	40-20k	2	F					
AUDIOANALYST (Phase Matrix)	M2	139.00		10	†		4	46-20 ±4	2		9 3/4 x 6 x 7	†5-in. woofer & 1-in. tweeter.	
AUDIOTEX (GC Electronics)	30-2654	\$82.45	45	6X9	25	4-8	40-18K	2	F		6X9X4		
	30-2656	\$87.65	30	6X9	20	4-8	40-20K	3	F		6X9X4		
	30-3058	\$19.35	20	6X9	10	4-8	50-16K		F		6X9X4		
	30-2650	\$42.60	20	6X9	10	4-8	50-16K		F		6X9X4		
	30-2651	\$48.90	25	6X9	20	4-8	40-16K		F		6X9X4		
	30-2652	\$62.45	20	6X9	10	4-8	50-18,700	2	F		6X9X4		
	30-2653	\$69.00	25	6X9	20	4-8	45-18K	2	F		6X9X4		
	30-2640	\$34.20	16	5 1/4	5.5	4-8	60-15K		F		5 1/4 x 5 1/4 x 4		
	30-2641	\$38.45	20	5 1/4	10	4-8	55-15K		F		5 1/4 x 5 1/4 x 4		
	30-2642	\$45.40	25	5 1/4	20	4-8	50-16K		F		5 1/4 x 5 1/4 x 4		
30-2644	\$69.90	25	5 1/4	20	4-8	50-20K	2	F		5 1/4 x 5 1/4 x 4			
BP ELECTRONICS	BP-2000 69-ORD	89.95	30	6x9	20	8	50-20	4					
MATRECS	MA-0525-00SP	\$26.00	16	5 1/4	5.5	4-8	60-15K		F		5 1/4 x 5 1/4 x 4		
	MA-0525-010P	\$30.00	20	5 1/4	10	4-8	55-15K		F		5 1/4 x 5 1/4 x 4		
	MA-0069-010P	\$31.00	20	6X9	10	4-8	50-16K		F		6X9X4		
	MA-0069-020P	\$37.00	25	6X9	20	4-8	40-16K		F		6X9X4		
	MA-0410-0010	\$12.00	15	4X10	10	4-8	60-14K		F		4X10X4		
	MA-0069-25CP	\$64.00	35	6X9	25	4-8	40-18K	2	F		6X9X4		
	MA-0069-20TP	\$68.00	30	6X9	20	4-8	40-20K	3	F		6X9X4		
	MA-0069-10DV	\$14.00	20	6X9	10	4-8	50-14K		F		6X9X4		
	MA-0057-0010	\$11.00	15	5X7	10	4-8	50-14K		F		5X7X4		
	MA-0525-020P	\$35.00	25	5 1/4	20	4-8	50-16K		F		5 1/4 x 5 1/4 x 4		
	MA-0525-20CP	\$53.00	25	5 1/4	20	4-8	50-20K		F		5 1/4 x 5 1/4 x 5 1/4		
	MA-0069-10CP	\$47.00	20	6X9	10	4-8	50-18K	2	F		6X9X4		
MA-0069-20CP	\$52.00	25	6X9	20	4-8	45-18K	2	F		6X9X4			
MOTOROLA	D5-10C	\$69.95	20	5.25	10	4		2	F				
	D5-20C	\$77.95	25	5.25	20	4		2	F				
	D69-20C	\$79.95	25	6x9	20	4		2	F				
	D69-20T	\$119.95	25	6x9	20	4		3	F				
PSB	PSB Alpha	220.00	15	†			4	90-20k ±3	2	S	9x4 1/2 x 5	†4-in. woofer & 1-in. tweeter.	
PYRAMID	PMS-5A		20					25-22k	3				
ROAD SOUNDS (Suntron)	RS543	\$39.99	25	5 1/4"	20	8		3	F		5 1/4" rd.		
	RS692	\$39.99	25	6x9	20	8		2	F		6x9		
	RS693	\$49.99	25	6x9	20	8		3	F		6x9		
	RS694	\$59.99	30	6x9	20	8		4	F		6x9		
	RS2000	\$89.99	50	6x4	10	4		2	S		6x4		
	RS3000	\$79.99	25	5 1/4	20	8		3	S		6x9		
	Series 5000	\$69.99	25	6 1/2	40	8		2	S		9x36		
RS3001	\$89.99	25	5 1/4	20	8		3	S		6x9			
SANYO ELECTRIC	SP795	\$129.95	30		10	4-8	100-20	2	S				
	SP777	\$129.95	30	6x9	20	4-8	60-20	3	F				
	SP 780	\$104.95	33.5	6x9	20	4-8	60-20	2	F				
	SP 770	\$99.95	28	6x9	20	4-8	45-20	3	F				
	SP 768	\$64.95	28	6x9	20	4-8	60-20	2	F or S				
	SP 757	\$49.95	18	5x7	15.3	4-8	70-15	2	F or S				
	SP 730	\$39.95	21	6	20	4-8	80-15	2	F				
	SP 720	\$34.95	14	4 x 4	6.7	4-8	80-12	2	F				

70

# CASSETTE TEST addenda

Howard A. Roberson

This article presents the results of evaluating cassettes that were received too late to be included in the survey in the September issue. Some facts of the first article deserve more attention, and those points will be covered first. Some confusion and a little discontent arose because of the author's use of the word "average." For each category of tape, from low-bias ferrics to high-bias non-CrO<sub>2</sub> tapes, the results for each test were added and divided by the number of cassettes in the category. The figure obtained, of course, is the mathematical average. Unfortunately, it appeared that some concluded that a rating of "average" for one of a group of high-performing tapes was little different from a rating of "average" for a tape in a lower-performance group. The listing of averages was for the purposes of comparison within a category and from one general category to another. If you're looking for particular results in performance, you have to look at the actual figures for the cassette under consideration.

It may turn out, however, that the best test for *your* needs did not have the widest frequency response, the highest maximum record levels, etc. The results presented in these two evaluation articles are indicative of maximum inherent tape capabilities, primarily because bias and EQ adjustments were made to show each formulation at its best. In the practical world of tape usage, the recordist may

very well find that a tape with an average rating gives him the best results. Here we must examine machine-tape inter-relationships more carefully.

The playback responses of all cassette decks are to the same standards, one for 120-microsecond EQ and one for 70-microsecond EQ. The output responses will be flat with good design and the appropriate flux levels on the tape. The flux patterns placed on the tape during recording are affected by such design elements as record equalization, record-head construction, and bias. The particular choices made by the designer, such as the peaking frequency for EQ and how much boost to use, include factors that will affect the measured performance of the *tape*. It is obvious that there has to be interaction among manufacturers so that the machine-tape combination can be improved. The end point of such a process can be when the deck manufacturer selects a particular formulation or two for use in machine set-up on the production line. Perhaps the best-known example is that of TDK SA, where the high-bias 70-microsecond combination is designed "SA" by JVC and others, rather than just "CrO<sub>2</sub>" as has been common practice in the past. If the maker of your deck gives such specific recommendations on tapes to use, that certainly is a very good place to start. You may want to try other cassettes with similar bias requirements if there is any question about the results with your particular

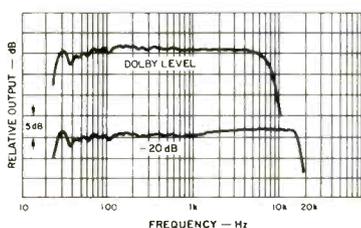
unit. If the list in the owner's manual is lengthy and unqualified, it is of limited value, and you should benefit from testing with the articles to aid you.

It would be nice, of course, if bias and EQ could always be adjusted to get good results whatever the tape being used. In the setting of bias and EQ for best frequency response at -20 dB, what do you have to lose? There are two major factors that cannot be ignored. First of all, reducing bias to extend the high end could increase the level of distortion. In the second place, extra peaking of EQ for good response at -20 dB can lead to much poorer response at 0 dB. For example, one of the tapes used in the survey had HDL<sub>3</sub>=2.2 percent at 6 dB above Dolby level with a 400-Hz signal. Not bad at all, but the -20 dB frequency response was 2 dB down at 10 kHz. With the bias reduced to get the 10-kHz response up to the same level as 1 kHz, the distortion increased to 3 percent for the +6 dB record level. If you *do* vary bias and/or EQ for better tape matching, use the controls judiciously. Be especially careful about trying to make too great a compensation, causing an increase in distortion or more loss in highs at elevated record levels.

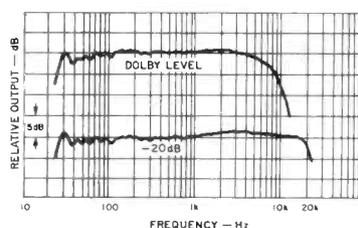
Use of another formulation could be a better choice, and this is certainly more easily accomplished. Remember that performance in Dolby mode will be affected by frequency-response variations and by errors in record-sensitivity calibration. Also keep in mind

71

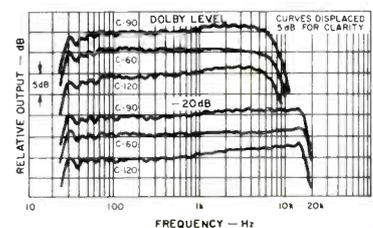
Denon DX3



Denon DX5



SDS HE



## MANUFACTURER'S SPECIFICATIONS

BRAND OR MANUFACTURER	TAPE DESIGNATION	TAPE TYPE	COER Oer	RET Gau	REM Max	SQU RAT	SENS dB	BIAS dB	PRICE C-90
Denon	DX3	Fe							
Denon	DX5	FeCo							
Maxell	LN	Fe	330	1200		0.82	0	0	
Maxell	UD	Fe	360	1450		0.87	+1	0	
SDS	HE	Fe	300	1400	0.19				\$4.49

that a multiplex filter sets a high-frequency limit regardless of the tape being used. A final example from a tape clinic: a lower priced deck was given a very poor rating by its new owner as it sounded so dull, particularly with Dolby, using Maxell UD XL-II. With such a good tape, how could the deck sound so bad? Checks with the pink-noise/RTA system showed that the CrO<sub>2</sub>-position response was terrible with any high-bias tape. In short order, it was determined, that the Reg record/playback responses with Maxell LN (an "average" ferric) were excellent. No matter what it says on the box of tape, you have to go by what you get with the tape and machine.

### Cassette Tests

After completion of the previous article on cassettes, samples were received from Denon, SDS, and Maxell. Denon supplied C-60 samples of the ferric DX3 tape and the ferri-cobalt DX5. The latter is recommended for the FeCr position, calling for normal bias and 70-microsecond EQ. SDS provided samples of their HE formulation in C-90, C-60, and C-120 lengths. The above tapes received the same schedule of tests as made in the major survey. Maxell sent new LN and UD formulations. Too few samples were received in time for this addenda to completely check consistency or to clarify some minor discrepancies. The results reported here for the Maxell tapes should be considered as preliminary. The table of manufacturers' specifications lists pertinent information as received. Test results for the Denon and SDS tapes are also tabulated. Please note that Denon DX5 is a different type of formulation and that it

calls for 70-microsecond EQ. It can be compared with the previously reported FeCr tapes.

**Denon DX3:** This recently introduced tape evidenced high MRLs, very good signal/noise ratio, and the most extended response at -20 dB and the lowest modulation noise for all ferric tapes tested to date. Bias, sensitivity, and skew were very consistent among the three C-60 samples. No C-90 samples were received to test and compare. The sensitivity variations were less than 0.2 dB, and there was one minor dropout. Overall, one of the best ferrics.

**Denon DX5:** This FeCo formulation, designed for use with FeCr settings, required careful bias and EQ setting for the best results. Its signal/noise ratio was lower than the true FeCr tapes, but it was superior to them in response at 0 dB, and MRL at 3 and 10 kHz. The high-end limit at -20 dB was easily extended to match any FeCr tape, albeit with a slight drop in MRLs. The C-60s received were consistent in bias and skew, but there were sensitivity variations with a total spread of 1 dB. There was one major, six medium, and three minor dropouts. *In toto*, an excellent performer.

**Maxell LN:** With just one sample each of C-90 and C-60, consistency could not be checked. The preliminary data obtained showed better frequency responses and MRLs compared to the data in the September issue, though the claimed improvements in signal/noise ratio and modulation noise were not apparent in this round of tests. While in general, there was evidence of worthwhile changes, the few samples available by deadline didn't allow the apparent discrepancies to be resolved.

**Maxell UD:** A fast look was also given to some new C-90s received of this modified formulation. Improvements noted included MRLs about 2 dB higher, responses slightly more extended and signal/noise ratio about a dB higher. One of the samples had a few minor dropouts; it would have been helpful to have had more samples to determine what was typical. In essence, these preliminary tests indicate that one of the best ferrics has become better yet.

**SDS HE:** With extended responses at both levels and higher-than-average MRLs across the band, this ferric tape is worthy of consideration for most purposes. Considerable overbiasing (re: 400-Hz peak) was necessary for flat response, especially with the C-120s. Bias requirements and skew were consistent among C-90s, but there were sensitivity variations of up to a dB and some high-end breathing (in level). C-60s required 0.9 dB less bias (-1.8 dB) and were 1.5 dB more sensitive. C-120s required 0.6 dB more bias (-0.3 dB), and even then had a high peak around 10 kHz. The C-120s were 2.5 dB less sensitive than the C-90s. There were random, but continual, sensitivity variations of 0.3 dB, and five minor dropouts.

With the above comments, we have reported on all formulations that we have been able to get samples of. The manufacturers are always in the process of refining the product even if they don't always give the formulation a new name. The results reported for the modified Maxell LN and UD are examples of this ongoing improvement. Future reports will be made as needed to keep readers informed on the constantly changing state of tape technology. A

## TEST RESULTS

BRAND OR MANUFACTURER	DESIGNATION	RESP. -3 DB @ kHz		MRL (dB re 0 dB) AT 4 FREQS. (Hz)				S/N RATIO	MOD NOISE	400-Hz SENS.	BIAS	EQ	WTD PK W&F %
		0 dB Level	-20dB Level	HDL <sub>3</sub> = 3%			Sat.						
				100	400	3k	10k	dBA	-dB	dB	dB	dB	
Denon	DX3	7.3	17.9	+6.6	+6.2	+2.0	-9.2	55.8	50.0	+2.2	+0.2	0	0.085
Denon	DX5	7.5	21.5	+5.0	+5.2	-3.8	-5.0	58.6	45.8	+0.8	-0.2	-2	0.075
SDS	HE	7.7	17.2	+1.7	+1.9	+3.3	-7.7	52.7	45.1	+1.5	-0.9	-1	0.08

**In 20 Years of Sound There's Been Nothing Like Our Programmable  
Digital Time Delay Computer.**

When Audio Pulse introduced the first digital time delay, people could hardly believe their ears. The computer system restored a convincing "concert hall" ambience to recorded music.

Now that we've introduced the remarkable Model Two, with its built-in amplifier and affordable price, we're even more convinced that you must hear it.

So, instead of telling you about the quantum leap it represents, or going into its ability to restructure your room electronically, or how you can own one for less than \$540 ... instead of all that, come in and take the "Blindfold Test For Ears." Then tell us what you think.

We're betting you'll choose our product with your eyes closed. Because there hasn't been an advance in sound since stereo to match it. And we're giving away the designer blindfold to mark the occasion.

- 
- Does the added dimension of depth seem more real?
  - Does it have the ability to acoustically change the size and shape of the room?
  - Does it change the sound characteristics of the room?
  - Can it be adjusted to make a room sound more live?
  - Can it enrich bass tones?
  - Does it improve the solo performance?
  - Can you get a sense of realism without high volume?
  - Does it improve mono recordings?

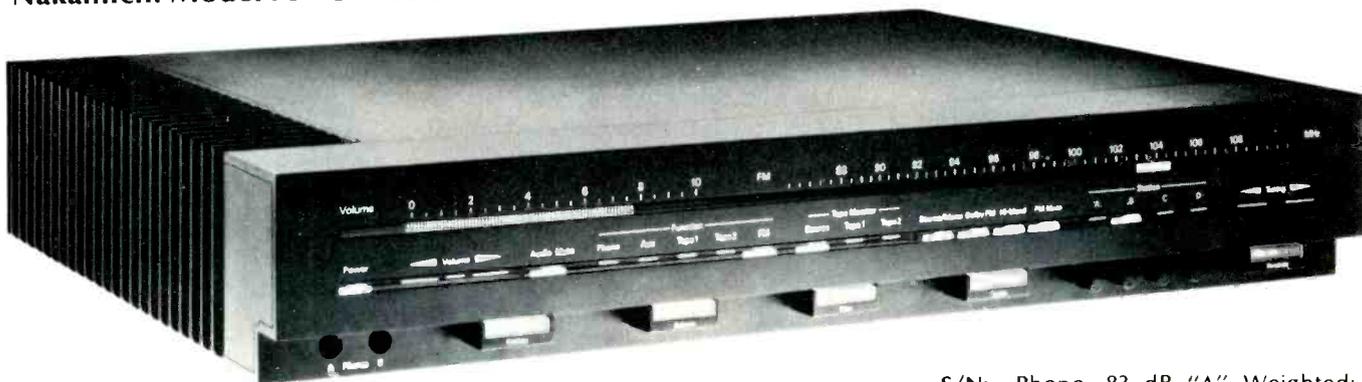
Tear this out and take it to your Audio Pulse Dealer.  
You can find him by calling toll-free (800) 423-4386.

**Audio**  **Pulse**

# The Blindfold Test For Ears

# Equipment profiles

## Nakamichi Model 730 Stereo FM Receiver



### MANUFACTURER'S SPECIFICATIONS FM Tuner Section

**Mono Sensitivity:** 12.0 dBf (2.2  $\mu$ V).  
**50-dB Quieting:** Mono, 18.3 dBf (4.5  $\mu$ V); Stereo, 38.3 dBf (45  $\mu$ V).  
**S/N:** Mono, 75 dB; Stereo, 68 dB.  
**Muting Threshold:** 20 dBf (5.4  $\mu$ V).  
**Frequency Response:** 30 Hz to 15 kHz, +0.5, -1.5 dB.  
**THD:** Mono, 0.1 percent at 1 kHz; Stereo, 0.15 percent at 1 kHz.  
**Capture Ratio:** 1.5 dB.  
**Selectivity:** 70 dB.  
**Spurious Rejection:** 90 dB.  
**Image Rejection and I.F. Rejection:** 85 dB.  
**AM Suppression:** 55 dB.

**SCA Rejection:** 70 dB.  
**Stereo Separation:** 45 dB at 1 kHz, 30 dB at 10 kHz.

### Amplifier Section

**Power Output:** 104 watts per channel, 8 ohms, 5 Hz to 20 kHz, with no more than 0.1 percent THD (150 watts per channel, 4 ohms).  
**Damping Factor:** 100 (1 kHz, 8 ohms).  
**IMD:** Less than 0.004 percent at rated output.  
**Frequency Response:** Phono, RIAA  $\pm$ 0.3 dB; High Level, 10 Hz to 30 kHz +0, -1.0 dB.  
**Input Sensitivity:** Phono, 2.0 mV; High Level, 100 mV.  
**Phono Overload:** 120 mV.

**S/N:** Phono, 83 dB "A" Weighted; High Level, 94 dB; Main Amp, 115 dB.  
**Bass and Treble Control Range:**  $\pm$ 12 dB at 20 Hz and 20 kHz.  
**Output Levels:** Rec Out, 100-300 mV variable; Preamp Out, 1.0 volts; Headphone Out, 60 mW/8 ohms.  
**Contour Control (Maximum):** -12 dB at 20 Hz, -23 dB at 3 kHz, -14 dB at 20 kHz.

### General Specifications

**Power Requirements:** 100-120V/220-240V, 50/60 Hz, 400 watts (max.).  
**Dimensions:** 19 $\frac{1}{8}$  in. (50 cm) W x 3 $\frac{1}{2}$  in. (8.9 cm) H x 14 $\frac{1}{2}$  in. (36.8 cm) D.  
**Weight:** 38 lbs. (17.27 kg).  
**Price:** \$1200.00; optional remote control system, \$190.00.

74 There is so much that is new and different about this, Nakamichi's first integrated receiver, that it would take several more pages of this magazine to fully describe it than have been allotted to this test report. We will therefore simply attempt to discuss some of the *highlights* of this FM-only receiver. The low-silhouette black, knobless front panel is very reminiscent of the styling treatment used by Bang and Olufsen in their award winning industrial designs for receivers, but with a Nakamichi touch or two added. All major control functions are handled by touch-sensing switches. A long, narrow slot along the entire width of the upper section of the panel houses a linear FM dial scale and pointer at the right, for about two thirds of its length, while the remainder of the slot is taken up by a striped, illuminated green filter and film shutter that regulates how many of the green stripes can be seen from the front of the receiver. This serves as an indication of volume level (calibrated from 0 to 10), which is controlled by touch-sensor switches that actuate a motor to drive the actual volume-control potentiometer.

Additional touch-sensor switches along the central section of the front panel include an audio mute switch, five program selector switches, three tape monitor switches (off, plus

two tape decks), a stereo/mono switch, Dolby FM switch, hi-blend switch, FM muting switch, four pre-set FM station switches lettered A through D, and up- and down-scan tuning switches. Along the very bottom of the panel are five small illuminated sliders. These control bass and treble response, channel balance, volume-contour pre-set, and FM muting threshold. Two stereo phone jacks are also positioned along the bottom edge of the panel.

The rear panel of the Nakamichi 730 is a bit more conventional in its layout. A 75-ohm coaxial connector is at the upper left and next to it are 300-ohm antenna terminals, while just below is a 20-dB attenuator switch and a chassis ground terminal. Phono, AUX and two sets of tape inputs and output jacks are also located in this area of the rear panel, and the recorder output jack level is controllable by means of a miniature control and knob just above these jacks. What a splendid idea for matching record output levels to the needs of one's particular tape deck, thereby enabling the user to operate the tape decks record level controls at most convenient points of rotation!

Preamp-out/main amp-in jacks, shipped with interconnecting jumpers, come next, followed by two convenience

a.c. receptacles and a master power on/off switch which is normally left in the "on" position so that the optionally available remote control unit can turn the unit on and off and so that the front panel "touch sensor" power switch circuitry can also turn on the rest of the unit. Spring-loaded, color-coded speaker terminals (only enough for one pair of speakers) are located at the extreme right of the rear panel.

### Circuit Features and Highlights

A close examination of the detail view of Fig. 1 discloses that the tuning system of the Nakamichi 730 employs a conventional tuning capacitor. How, then, can it scan up and down the dial, remember four pre-set stations, and lock in when stations are properly tuned? (Most receivers and tuners with this capability employ varactor tuning diodes.) By having the tuning capacitor driven by a tiny motor, that's how! The 730 employs a most unique tuning system. A touch of one of the scanning sensors starts the tuner scanning for stations. The command is committed to IC memory. The tuning motor turns, and the rotation is transmitted through gears and a timing belt to the variable capacitor. If the level of a signal scanned is above threshold, the tuner next checks noise level for an indication of quieting and seeks out the center of the channel as indicated by the zero-point of the

detector's "S"-curve. The motor stops rotating, and green tuning indicators on either side of the dial pointer glow. Seven seconds later the system "locks on" to the signal. This system offers tuning precision within  $\pm 5$  kHz of channel center.

The variable capacitor includes an AM section, even though there is no provision for AM reception in this receiver. The AM variable capacitor is actually used in connection with the four-station pre-set feature, its capacitance serving as part of a discharge circuit, with capacitance varying in accordance with the angle of rotation of this capacitor, which is mounted concentrically with the main FM tuning capacitor sections.

Mode and function selection are controlled using logic-controlled, touch-sensor switches, as previously explained. Figure 2 shows the basic circuit for function selection. Touching sensor 1 causes a resistance change which turns on Q1. This command is committed to a C-MOS memory, and an electronic analog switch routes the proper audio signal. The analog switches of the 730 are entirely nonmechanical and can therefore be located at the most convenient point inside the receiver, reducing point-to-point wiring.

Figure 3 shows the basic volume control circuit. Touching the right-pointing sensor applies voltage to the positive side

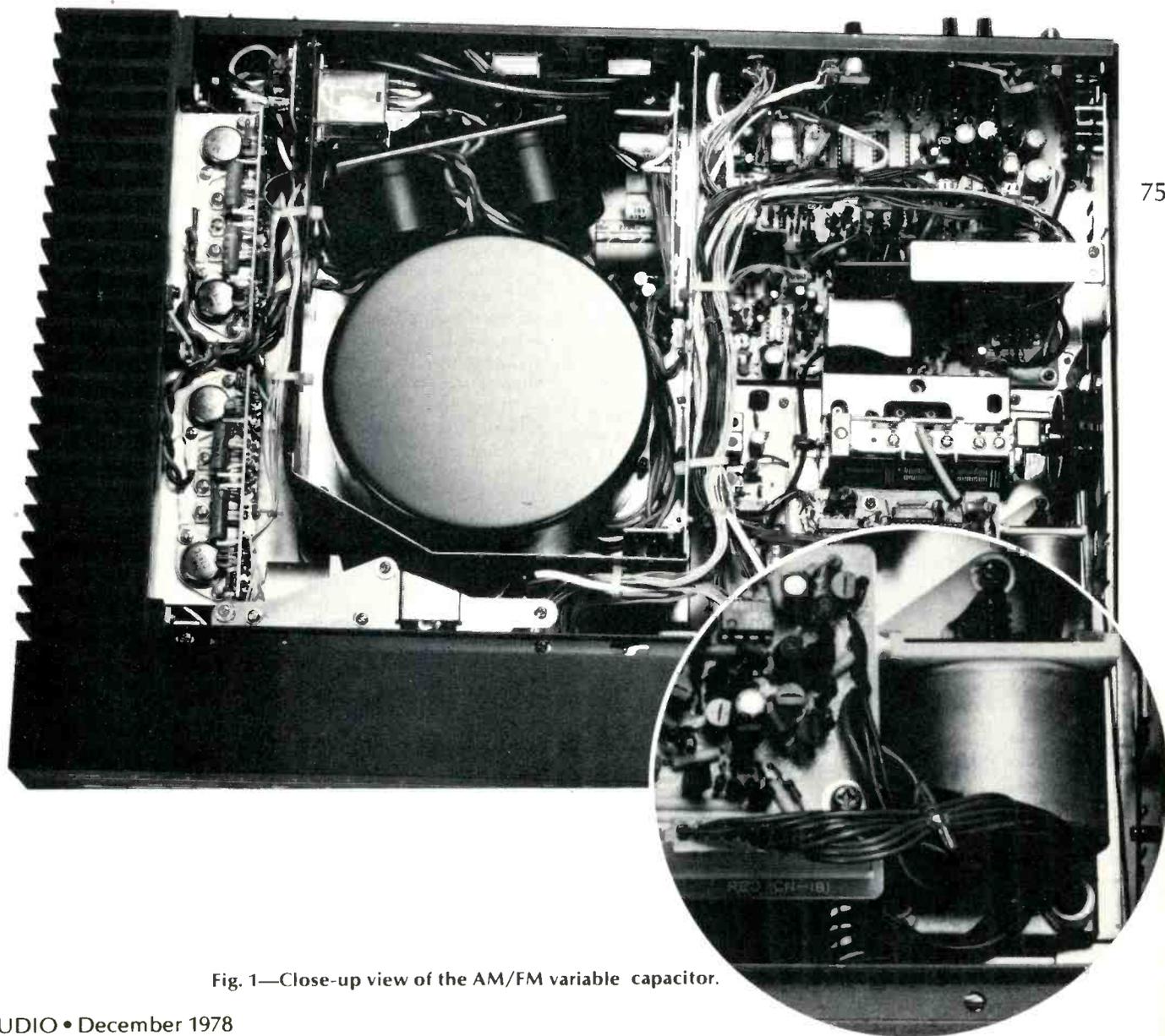


Fig. 1—Close-up view of the AM/FM variable capacitor.

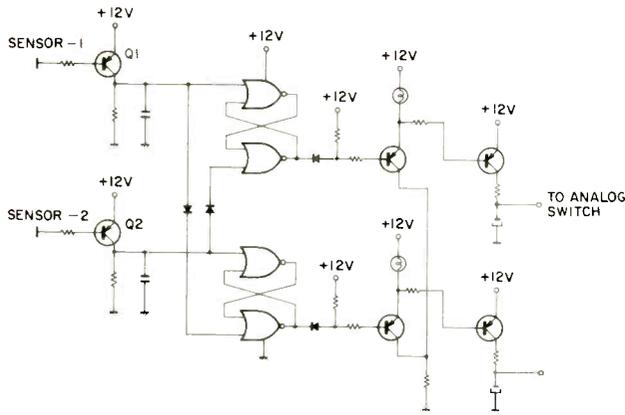


Fig. 2—Function selector network.

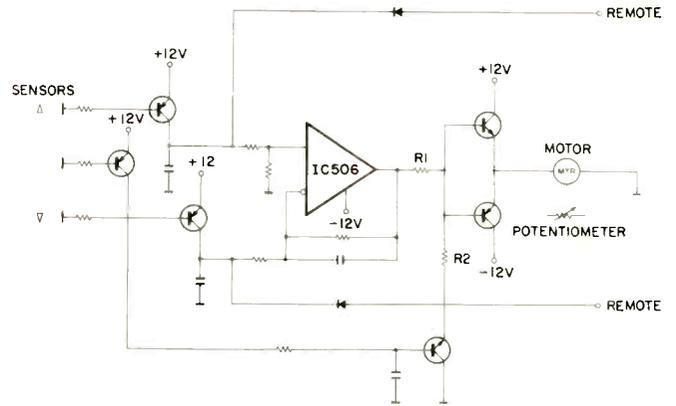


Fig. 3—Volume control network.

of IC-506, while touching the left-pointing sensor applies voltage to the negative side. The motor begins rotating accordingly, and this rotation is transmitted and gear-reduced down to the volume-control potentiometer. Clutches are provided at minimum and maximum settings of the volume control. If the user touches either directional sensor plus the center sensor, output voltage of IC-506 is divided by R1 and R2, and motor speed is reduced by a factor of two, for fine meter adjustment. Figure 4 illustrates the mechanical arrangement which controls the volume control and its associated green-striped display visible from the front panel.

As for the more conventional portions of the receiver, the front end employs a dual-gate MOS-FET in its r.f. stage, while four carefully matched stages of ceramic filtering are used in the i.f. section. This combination filter, plus a surface wave filter and a two-stage, linear-phase LC filter, provides excellent selectivity and extremely flat group-delay characteristics in the i.f. circuitry. The MPX circuit employs the now-familiar phase-lock loop principle.

The phono preamplifier incorporates a triple-transistor circuit originally developed for Nakamichi's 610 preamplifier. The three devices act as a single transistor, having one-third the internal impedance of a conventional transistor.

According to Nakamichi, the power amplifier feedback configuration of the 730 overcomes the trade-off between conventional amplifiers and d.c. configured amps (good current stability for the a.c. amp at the expense of better low frequency response and lower phase error exhibited by dc

amps). The 730 power amp uses a double negative-feedback circuit illustrated in block diagram form in Fig. 5c. The main feedback loop (R1, R2) does not include C1. In addition, current through C1 is very low, since R3 is much greater than R1. Distortion is therefore minimized by the double negative-feedback approach. The circuit also benefits from good direct-current stability, since the impedance of the negative input of the feedback amplifier is sufficiently greater than R3. This double negative-feedback principle is used in the preamplifier as well as in the power amp section.

#### FM Tuner Section Measurements

Figure 6 contains plots of quieting and distortion characteristics of the tuner section of the Nakamichi 730 receiver in both mono and stereo modes, for a 1-kHz, 100 per cent modulated test signal. S/N in mono reached 79 dB, while in stereo the best S/N obtained was 72 dB. Harmonic distortion was an incredibly low 0.06 per cent in both mono and stereo for a 1-kHz test signal. As shown in Fig. 7, THD in both mono and stereo remained consistently low at all frequencies of interest, rising to 0.15 per cent at 6 kHz for stereo. Figure 8 is a plot (taken with our spectrum analyzer) of frequency response (in stereo), stereo separation (lower curve) and stereo separation with the high-blend filter switched on. At 1 kHz, stereo separation measured 50 dB, decreasing to 41 dB at 100 Hz, and to 37 dB at 10 kHz. The 50-dB quieting point was obtained with input signal strengths of 12.4 dBf (2.3  $\mu$ V) in mono and 35.6 dBf (33  $\mu$ V) in stereo. Stereo switching threshold was set at 25.2 dBf (10  $\mu$ V), while muting threshold was variable from 14.7 dBf (3.0  $\mu$ V) to 31.2 dBf (20  $\mu$ V). Frequency response for both the 75-microsecond and Dolby 25-microsecond settings was down less than 1.0 dB at 15 kHz. The action of the Dolby circuitry is graphically displayed in Fig. 9. Note that at lower modulation levels, the high frequency response is attenuated progressively (as it should be) by the built-in Dolby FM-playback circuitry.

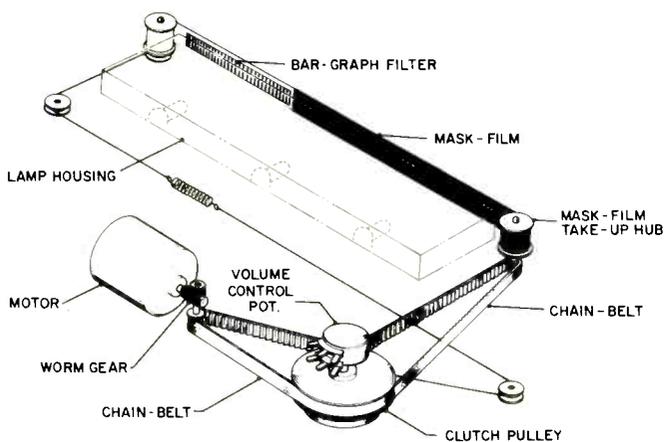
Capture ratio measured 1.4 dB, a bit better than claimed. Selectivity measured 75 dB, while spurious, i.f., and image rejection all measured approximately 90 dB. AM suppression was exactly 55 dB as claimed. Sub-carrier products were all lower than residual noise level in stereo, and were therefore better than 72 dB down.

#### Amplifier Measurements

Harmonic distortion of the power amplifier section of this receiver is so low at all but near-rated power output levels that it is completely buried beneath the residual noise level and cannot be isolated by our test equipment (including our spectrum analyzer). The graphs plotted in Fig. 10, therefore, merely depict the points at which any THD could be

76

Fig. 4—Volume control mechanism.



# The evolution of the revolution.

## The new Bose® 901® Series IV Direct/Reflecting® speaker.

When Bose introduced the original 901® speaker, high-fidelity critics around the world hailed its revolutionary approach to sound reproduction.

"Bose has, in a single giant step, produced one of the finest speaker systems ever made." (USA)

"The orchestra is there in front and the atmosphere of the concert hall all around." (Belgium)

"Bose contains more technical innovations than any other speaker of the past 20 years." (Austria)

"...sets new standards for loud-speaker music reproduction." (France)



Now the 901® has evolved. Again. Introducing the Bose 901 Series IV Direct/Reflecting® speaker system. With new equalizer controls that consider your room as part of the speaker design. And a new answer to the problem of choosing an amplifier.

It is a known fact that moving a speaker just a few feet in a room will alter its performance. And that the variances in a speaker's performance from one living room to the next can be vast. This is a problem all speakers have regardless of design. Except one.

A new approach to the study of listening room acoustics and an ambitious survey of many actual listening rooms has resulted in new equalizer controls for the Bose 901 IV. These controls allow you to simultaneously adjust several bands of frequencies in a precise manner to match the per-

formance of the 901 IV to your room. In a way that cannot be duplicated even with an expensive graphic equalizer.

As a result, the 901 Series IV speakers perform as well in the living room as in the demonstration room.

Were our engineers to design a speaker specifically for your living room, you would not get better sound than you do when you properly adjust the equalizer controls on the Bose 901 Series IV.

And the 901 IV provides a simple answer to the problem of choosing the power rating of your amplifier or receiver. Choose any amplifier you wish. The 901 IV provides surprisingly loud sound with as little as 10 watts per channel. Yet it is durable enough for us to remove all power limitations on the 901 IV. There is no power limit. Period.\*

With these new improvements, the Bose 901 IV gives you a flexibility no other speaker can. You can place the 901 IV in almost any room and get the life-like, spacious sound for which the 901 IV

Direct/Reflecting® speaker is famous. And you can match it to virtually any amplifier.

We think that once you hear the new Bose 901 IV Direct/Reflecting® speaker, you'll agree. The revolution has evolved.



\*There is a power limit in commercial applications. For information, contact Bose Customer Service.

**BOSE**

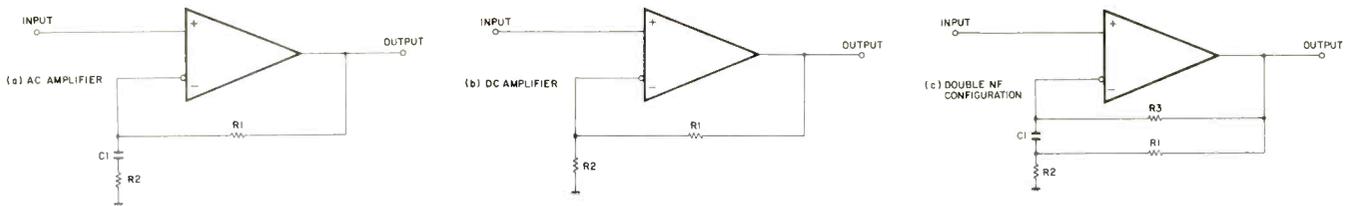


Fig. 5—Three basic negative-feedback circuit designs.

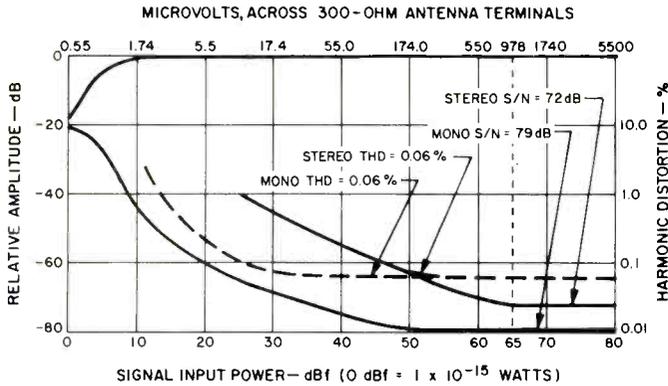


Fig. 6—Mono and stereo quieting and distortion characteristics.

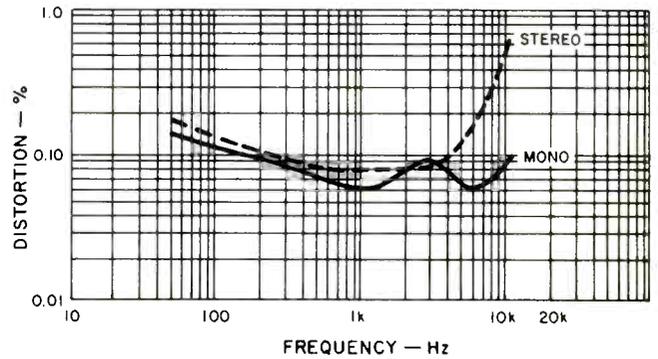


Fig. 7—Harmonic distortion vs. frequency, mono and stereo FM.

78

observed. The amplifier delivered 111.75 watts for rated THD of 0.02 percent at 1 kHz. Full-power bandwidth extended from 15 Hz to 21 kHz (for rated power at rated THD), and FTC rated power measured 108 watts per channel, as opposed to the 105 watts claimed. Dynamic headroom measured exactly 1.0 dB, while clipping headroom was a modest 0.21 dB above rated output. Damping factor, measured at 50 Hz, was over 100. Figure 11 is a plot of harmonic distortion versus frequency for a rated output of 105 watts per channel into 8-ohm loads.

In an attempt to determine, even if indirectly, the sort of low-level distortion components we were dealing with here, we combined our spectrum analyzer with the facilities of our Sound Technology Model 1700B and, using the analyzer in its linear sweep mode, we first displayed a reference 1-kHz signal at rated output (full scope face peak shown in Fig. 12). We then established a new top-of-scope-face reference of -70 dB by using the distortion components output jack of the 1700B as a signal source to be fed to the analyzer and allowed the analyzer to sweep linearly from 0 to 20 kHz. The first "blip" visible to the right of the reference fundamental signals represents second order harmonic content and is 96 dB below rated output! Third order distortion is even lower, at -105 dB with respect to referenced out put. That's a third

order distortion amounting to 0.00056 per cent — considerably lower than our distortion analyzer (or anyone else's that we know of) can read!

Tone-control action of the receiver is quite conventional, with turnover frequencies well positioned in the audio spectrum, as shown in the sweep-frequency photos of Fig. 13. Sensitivity and the signal-to-noise measurements were made in accordance with the new IHF Amplifier Measurement Standards and may therefore be a bit difficult for the reader to interpret until some experience has been gained with these new standards. Nonetheless, on the basis of the new measurement techniques, S/N in phono measured 82 dB ("A" weighted, for a 5-mV input reference and a 1-watt output level reference). High-level-input signal-to-noise ratio, measured in a similar manner (0.5 volt input reference level), was 85 dB. Phono sensitivity (referred to 1-watt output) was 0.24 millivolts, while high-level input sensitivity was 10 millivolts (for 1-watt output). RIAA equalization was accurate (with absolutely no deviation) from 30 Hz to 10 kHz and was a miniscule -0.2 dB down at 15 kHz. At minimum volume settings, signal to noise (this time referred to full rated output) was 105 dB "A" weighted.

Using the volume preset control in its loudness contour settings in combination with a fixed setting of the main volume control of the receiver resulted in an adjustment and

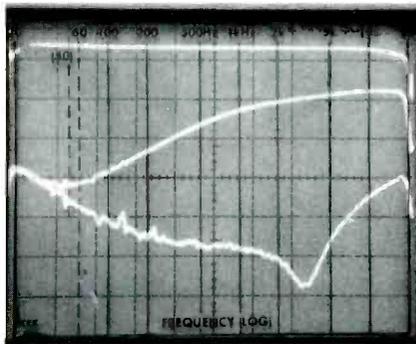
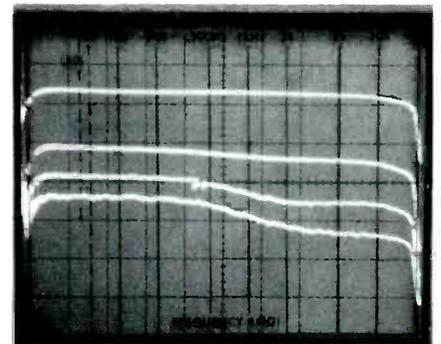


Fig. 8—Frequency response and separation. Middle curve shows decreased separation when Hi-Blend filter is used. (Each vertical division is 10 dB.)

Fig. 9—Action of Dolby N/R FM circuitry at various modulation levels.



0.05%  
NAB WRMS

0.05%  
NAB WRMS

# Neatness counts.

You are looking at graphic measurements of wow and flutter in two different cassette decks. The nice, neat one is ours. The one with the funny spikes is the competition. What is really interesting about this comparison is that the numerical specification for wow and flutter for both machines is identical: 0.05 percent.

How can that be?

The reason is that conventional measurements do not account for some kinds of disturbances caused by momentary tape speed variations. Many manufacturers simply ignore or overlook the spikes. We don't. Because we can hear them. And

if we can hear them, you can hear them. So we build tighter tolerances into our parts—such as our precision-machined reel tables and shafts that prevent cogging of the cassette hubs. The fact is that we use a lot of unconventional methods of getting rid of a lot of conventionally ignored distortions.

We figure our most important test instrument is our ears. You can build good cassette decks in the laboratory. But you build great ones in the listening room. That's why our engineers listen, under dynamic test conditions, to every single electrical and mechanical component of our cassette decks

that can affect the texture of the sound you hear.

You'll find that every one of the new Harman Kardon cassette decks has the features, specifications, the look and the feel you'd expect from equipment made by one of the world's great high fidelity manufacturers.

But you'll find some thing else too.

The clean, open sound that comes only when a company listens and pays attention to details that others tend to overlook.

That's what makes us so neat.

Come listen soon.



**harman/kardon**  
Hear all the music.

55 Ames Court  
Plainview NY 11803

*Pictured: The new hk3500 Dolby® cassette deck. Not shown: Models hk3500 and hk2500.*

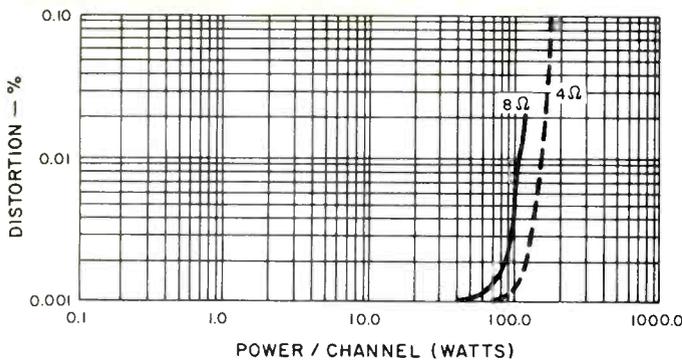


Fig. 10—Power output at 1 kHz vs. distortion.

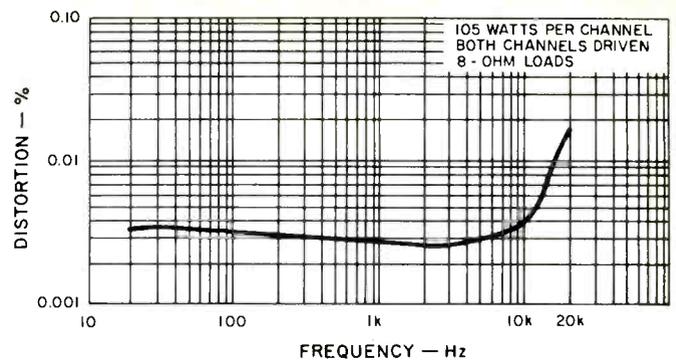


Fig. 11—Harmonic distortion vs. frequency.



contour range illustrated in the sweep-frequency 'scope photo of Fig. 14. As we have commented in several previous reports, this approach to loudness compensation (also used by such firms as Yamaha and Sherwood) makes a good deal more sense than the arbitrary volume control/loudness switch arrangement supplied by most other receiver manufacturers, since it works independently of program source levels and speaker efficiencies.

80

### Listening And Use Tests

Here is another receiver whose measured specifications fail to tell the whole story. To begin with, the unit is an absolute delight to use. Touch-sensor switches work positively and correctly — every time. Tune scanning speeds have been carefully calculated to be neither too fast nor too slow, and the volume control adjustment method is actually smoother than you could obtain with a conventional rotary control knob and, frankly, a lot more fun to use.

The tuner section zeros in on center-channels as accurately as any tuner we have ever adjusted manually, which means that the distortion values we read on the bench are the ones we actually obtained (and that you will obtain) when using the tuner section for actual FM program listening. Every aspect of human engineering has been analyzed and correctly interpreted in the overall design of this receiver.

As for the amplifier and its ability to reproduce music faithfully, it is certainly the equal in performance to Nakamichi's separate amplifiers which we have much admired in the past. Bass is tight and well defined, and transient recovery is so good we found it hard to believe that the amp is *not* a d.c. design.

If you were to judge this magnificent receiver on the basis of watts per dollar alone, you will of course conclude that it is very high priced. Certainly you can buy 105 (or more) watts per channel for far less than \$1200.00. But if you are the type of audio enthusiast who seeks a measure of elegance and sophisticated performance embodied in the Nakamichi 730 receiver, its price will be of secondary importance to you. After all, many people thought this little company was a bit crazy when they introduced a stereo cassette deck selling for well over \$1000.00 a few years ago. It was the instant success of that deck (now in its second edition) and subsequently designed products in the same category that probably enabled Nakamichi to enter the more competitive field of tuner, amplifier and now receiver manufacturing. I suspect that the same Nakamichi followers (or people like them) who "dared" to buy the first three-head Nakamichi cassette decks ever produced will feel no differently about the first, twin motor-driven receiver from that same innovative firm.

Leonard Feldman

Enter No. 90 on Reader Service Card

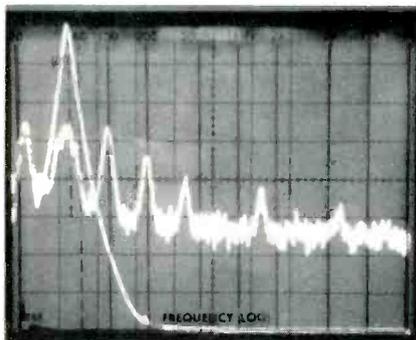


Fig. 12—Spectrum analysis of harmonic distortion components of amplifier section. Reference 1-kHz signal, reaching top of display, is at -70 dB, 2nd-order distortion is approximately -96 dB below rated output, while 3rd-order distortion is down more than 105 dB!

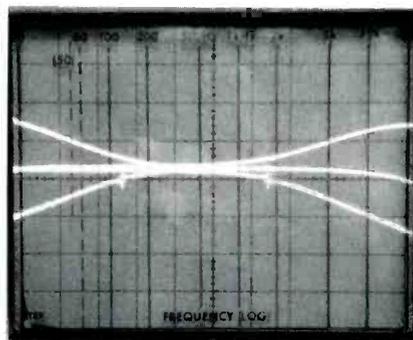


Fig. 13—Tone control range.

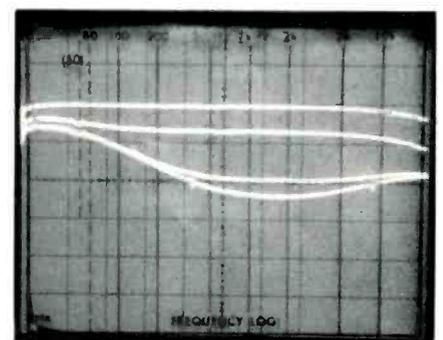


Fig. 14—Loudness compensation available through combined use of volume and volume preset controls.

# HITACHI

## The New Leader In Audio Technology



...introduces the world's most powerful 50 watt receiver.

The new Hitachi SR 804 stereo receiver has the revolutionary Class G amp that instantly doubles its rated power from 50 to 100 watts to prevent clipping distortion during those demanding musical peaks (note the clipped and unclipped waves in the symbolic graph above). The SR 804 is conservatively rated at 50 watts RMS, 20-20,000 Hz into 8 ohms with only 0.1% THD.

Class G is just one example of Hitachi's leadership in audio technology. Power MOS/FET amplifiers, R&P 3-head system cassette decks, Uni-torque turntable motors, and gathered-edge metal cone speakers are just some of the others. There's a lot more. Ask your Hitachi dealer.

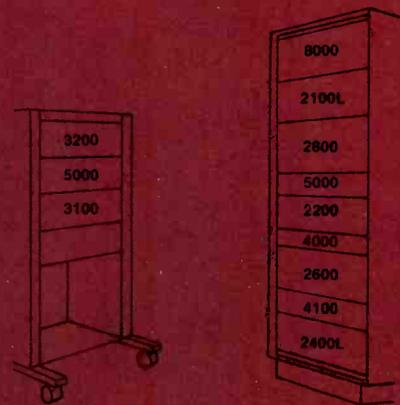
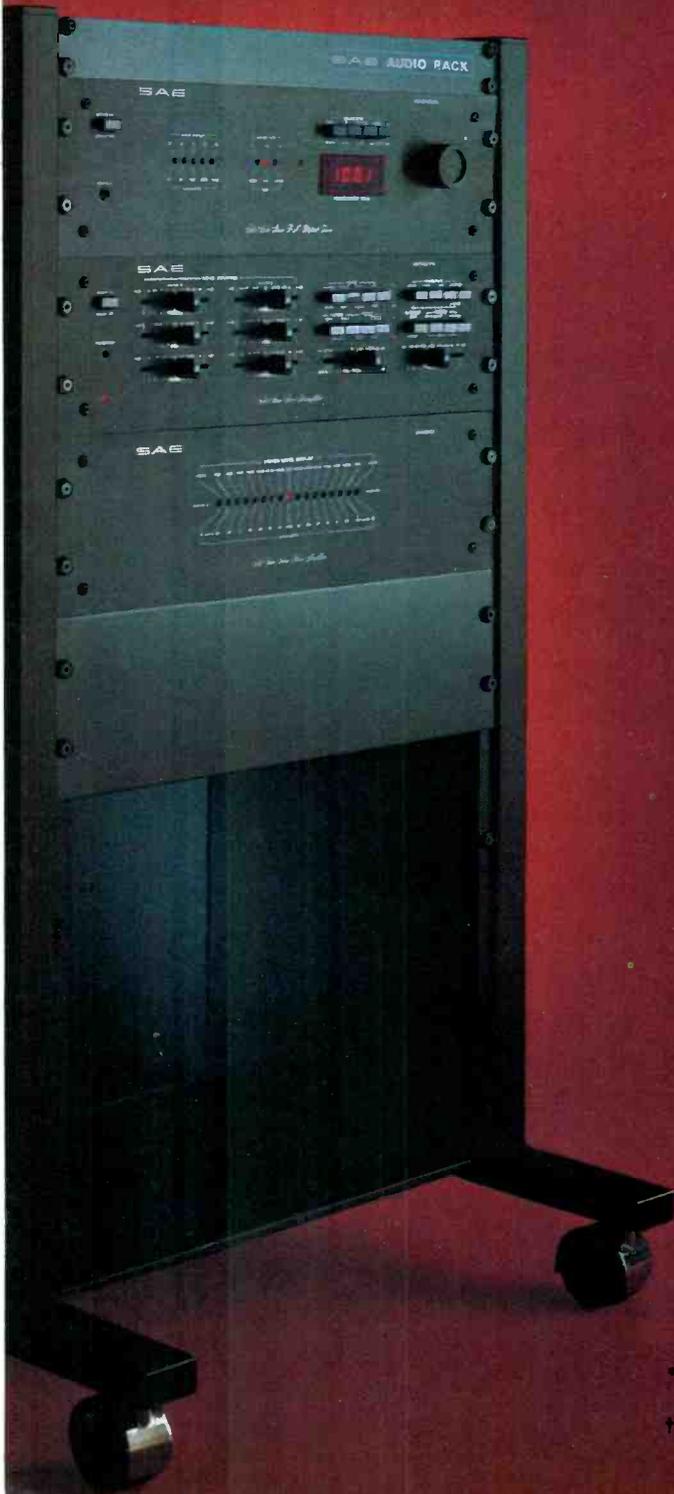


**HITACHI**  
When a company cares,  
it shows.

## from the Sublime . . .

comes a sweeping line of high end components covering the extremes of audio excellence. Rugged. Daring. Unmistakably majestic.

Beginning with the basic system — a 3200 FM Digital Tuner with LED signal-strength and center-tuning indicators for accurate, crystal clear FM reception; a 3000 Preamp, with 3-way tone controls and tape EQ which allows you to equalize both record and playback; and a 3100, 50 watt\* per channel Stereo Power Amplifier with fully complementary design for life-like sound — mounted in our sturdy, professional R-1 equipment rack all for a suggested price of \$1300.†



\*Minimum RMS watts per channel, both channels driven into 8 ohms from 20Hz to 20kHz at less than 0.05%.

†Nationally Advertised value, actual retail prices are established by SAE Dealers.

# to the Ridiculous

which some people would say is extreme. But to the true audiophile it is the ultimate answer. Bold. Sophisticated. Sonically alive.

This super system features an 8000 FM Digital Tuner with steep quieting and phase lock loop for low distortion; a 2100L Preamp with LED level display and a two stage phono circuit; a 2800 Parametric Equalizer, developed in the recording studio to provide the maximum flexibility obtainable in tone control systems; a 5000 Impulse Noise Reduction System which dramatically reduces the effects of record scratches; a 2200, 100 watt\* per channel fully complementary Stereo Power Amplifier; a 4000 Electronic Crossover to make even the best speakers sound better; a 2600, 400 watt\* per channel super high power amplifier; a 4100 Time Delay Ambience System for the re-creation of a live environment; and a 2400L, 200 watt\* per channel fully complementary Stereo Power Amplifier pictured in the professional's choice, our 60 inch C-10 equipment rack all for a suggested price of \$6250.00†.

The extremes of audio excellence—and everything in between— from SAE.

For more information about the sublime to the ridiculous, write:

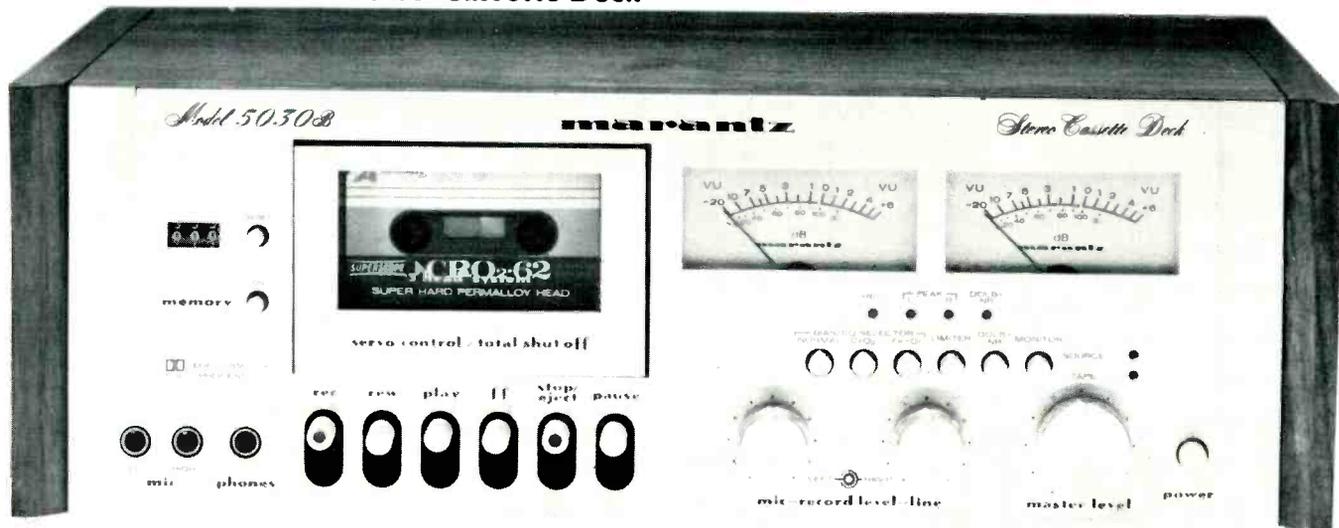
# SAE

Scientific Audio Electronics, Inc.

P.O. Box 60271 • Los Angeles, California 90060



# Marantz Model 5030B Stereo Cassette Deck



## MANUFACTURER'S SPECIFICATIONS

**Frequency Response:** 35 Hz to 14 kHz, 35 Hz to 17 kHz with FeCr or CrO<sub>2</sub> tapes.

**Signal-to-Noise Ratio:** 58 dBA, 64 dBA with Dolby N/R.

**Input Sensitivity:** Mike, 0.16 mV; Line, 50 mV.

**Output Level:** Line, 800 mV; Head-  
phone, 43 mV.

**Flutter:** 0.05 per cent W rms.

**Wind Time:** 105 seconds for C-60 cas-  
sette.

**Dimensions:** 17-3/8 in. (441 mm) W x  
5-3/4 (146 mm) H x 11-11/16 (297 mm)  
D.

**Weight:** 14.8 lbs. (6.7 kg).

**Price:** \$419.95.

84

The Marantz 5030B cassette deck offers a true three-head design for a medium price. The record and playback heads are actually separate structures, but mounted within a single metal enclosure. A shielding board between the two heads minimizes cross feed. Access to the heads for cleaning and demagnetizing is quite good with the door cover removed (easily snapped out) and the unit in *Play* mode without a cassette. Loading and unloading is direct and was smooth in action. Medium force was required to actuate the tape motion levers, lighter than most units with this design. It was possible to go into *Play* from winding, but undesirable tape loops were formed when doing so. The tape counter includes the useful memory function. The meters have fluorescent scales, blue from -20 to -1 and red from 0 to +6, without any direct illumination. Below are the LED record and Dolby NR status lights and peak-level indicators for each channel, which offer some advantage over a single one for both channels. Three push-button switches select bias and EQ for low-noise, FeCr or CrO<sub>2</sub> tapes. Similar switches provide on/off control for Dolby NR and a limiter, and monitor selection, source or tape, which has two associated status lights.

The input-level control facilities are superior to most decks with full mike and line mixing and an always-useful master level pot. The knobs on the mike and line dual-concentric pots are of good size and finely knurled. As the non-clutched knobs in each set are very close to the same diameter, both channels can be adjusted at the same time if desired. Mike input and headphone jacks are on the front panel, and line in and out phono jacks are on the rear panel. A ground post and a multiplex filter switch are also on the back panel, a location which may keep the switch position out of mind. Accessory handles are available for rack mounting.

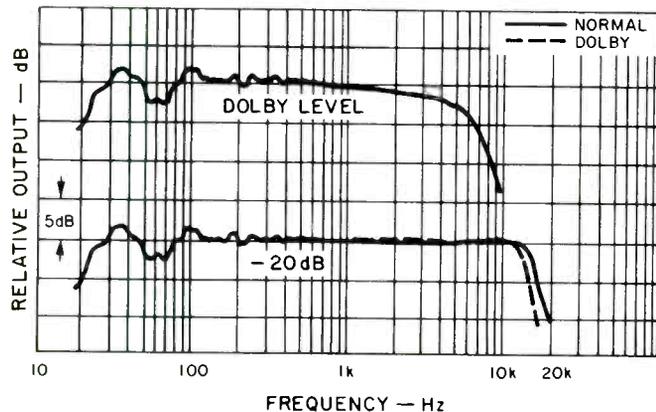
Soldering on the PCBs was excellent. The trimmed leads seemed a trifle long, but there were no danger spots, and troubleshooting would be facilitated. Wirewrap was used for intercard wiring. Adjustments were labelled, and parts were identified. It was noted that higher wattage resistors were mounted on ceramic standoffs and that the rugged bottom and side construction of the chassis was well suited to rack mounting.

## Performance

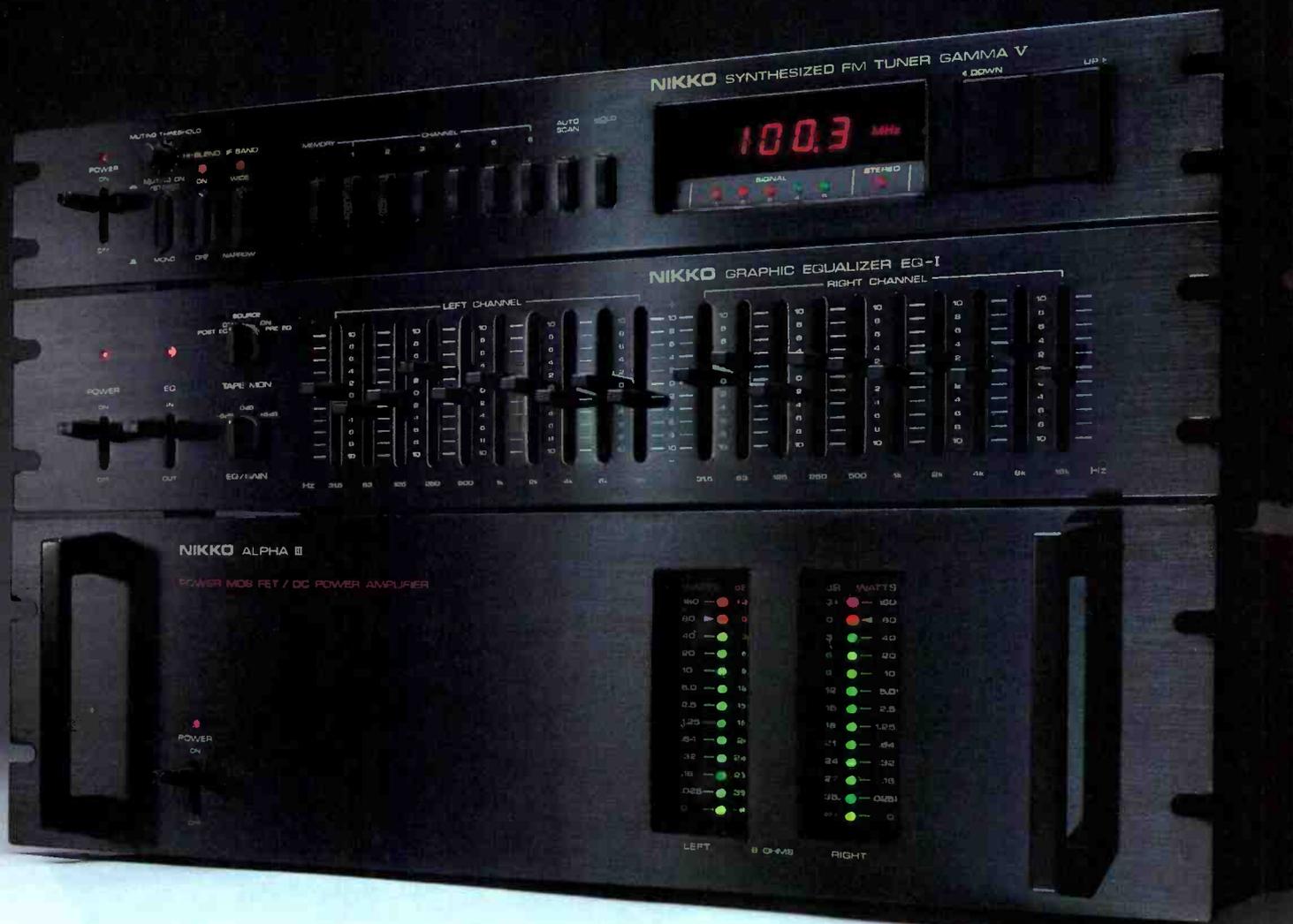
The playback responses with standard tapes were generally very smooth, but there was a dip of about 5 dB with the 63 Hz tone. Playback of standard levels gave indications about a dB low, and play speed was about 0.7 per cent fast. Record/playback responses were best with Sony UHF, Sony FeCr, and TDK SA. Results were also good with other tapes with similar bias requirements, such as Ampex Grand Master, Audio Magnetics High Performance, Scotch Master III, etc. Over the majority of the band, the responses 20 dB below Dolby level were very flat, with deviations of less than a dB with all three tapes. Also to be applauded were the very minor deviations when switching to Dolby mode, especially with TDK SA. High end limits in normal mode were 5.8, 3.1, and 6.3 kHz at Dolby level for Sony UHF, Sony FeCr and TDK SA, respectively. With the level 20 dB lower, roll-off was at 16.1, 20.3 and 19.5 kHz for the same tapes.

At 100 Hz and below, head contour effects were evident, especially with the broad dip around 60 Hz, almost 3 dB

Fig. 1—Frequency response with Sony UHF.



# Nikko. Accuracy Unlike Any Stereotype.



Hearing the seed of sound is what high technology is all about. Many stereotypes will predictably claim they've reached it . . . but only Nikko Audio actually delivers that pinnacle of purity through three new components in our professional series.

## Gamma V Synthesized FM Digital Tuner

Six of your favorite stations can be exactly tuned into the memory bank for instant recall. With phase-lock-loop, twin-staged synthesized manual or automatic tuning circuitry throughout the entire FM band, you can be assured your stations will never fade away as the LED readout brightly shows the locked-in MHz numbers. Accuracy on the button.

## Alpha III Power MOS-FET DC Amplifier

Accentuated accuracy. DC powered MOS-FET circuitry assures ultra wide frequency response at rated output, while the continuous DC operation from input to output stages guarantees absolute stability and extremely low distortion.

The LED window monitors the pulse of power in each channel. Plus, the THD is the lowest in the industry at anywhere near the price range —

0.008% (80 watts per channel, both channels driven into 8 ohms, 20 Hz to 20kHz).

## EQ 1 Graphic Equalizer

For the discerning ear, you can shape the acoustics of your room into those of a recording studio with Nikko's EQ 1. At 10 bands per channel providing  $\pm 12$ dB boost or cut and  $\pm 6$ dB gain control, you will be in master control of all your live-sounding performances.

All three components can be professionally stacked into Nikko's new 19" rack mount cabinet. But hearing is believing.

Call our toll-free number for the name of your nearest Nikko dealer at (800) 423-2994 and find out why Nikko's reputation for accuracy is forever sound.



# Nikko Audio

For those who take their stereo seriously

Nikko Electric Corp. of America  
 16270 Raymer Sr., Van Nuys, Calif. 91406 (213) 988-0105  
 218 Sherwood Ave., Farmingdale, N.Y. 11735 (516) 293-2906  
 In Canada: Superior Electronics, Inc. ©Nikko Audio 1978

Enter No. 39 on Reader Service Card

deep. The -3 dB point was actually reached at 23 Hz in all cases, certainly very good. One hopes that future designs will show less deviation in this region. The playback of a recorded 10-kHz tone showed close to 70 degrees phase discrepancy between channels, indicative of the challenge of mounting head sections in perfect alignment. The phase jitter was just 20 degrees, the best ever measured on a cassette deck. The multiplex filter was down 26 dB at 19 kHz, 29.5 dB at 18.6 kHz. Bias was of low level in the output, whether switched to *Source* or *Tape* playback.

The relative level of third harmonic distortion was measured vs. record level from -10 dB (re: Dolby level) to the 3 per cent distortion point. The plotted curves were unusual in two respects. First of all, amplitude compression appeared without the expected high rise in distortion, causing the curves to bend flatter rather than more sharply upward. The net result was that overload was more gradual than with other decks, particularly with Sony UHF. The other different-from-normal aspect was the lowest distortion performance with a chrome-type tape (TDK SA). Low-noise tapes have that distinction with most decks. On the other hand, TDK SA showed slightly higher HDL<sub>2</sub> than the other two tapes. HDL<sub>5</sub> was very low for all tapes at all record levels. HDL<sub>3</sub> vs. frequency with TDK SA at 10 dB below Dolby level was low over most of the range, but on the high side around 5 kHz. The use of Dolby reduced distortion products for all tapes at all levels across the entire frequency band, much better results than with most decks.

The signal-to-noise ratios at Dolby level were 54.1, 58.4 and 57.4 dBA for Sony UHF, Sony FeCr, and TDK SA, respectively. With a record level to cause HDL<sub>3</sub> = 3 per cent, the results

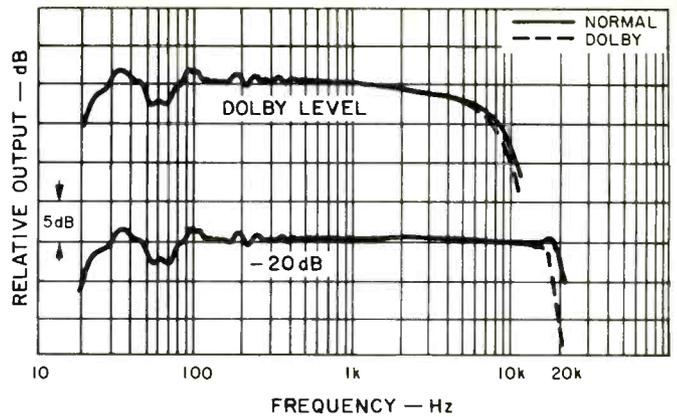
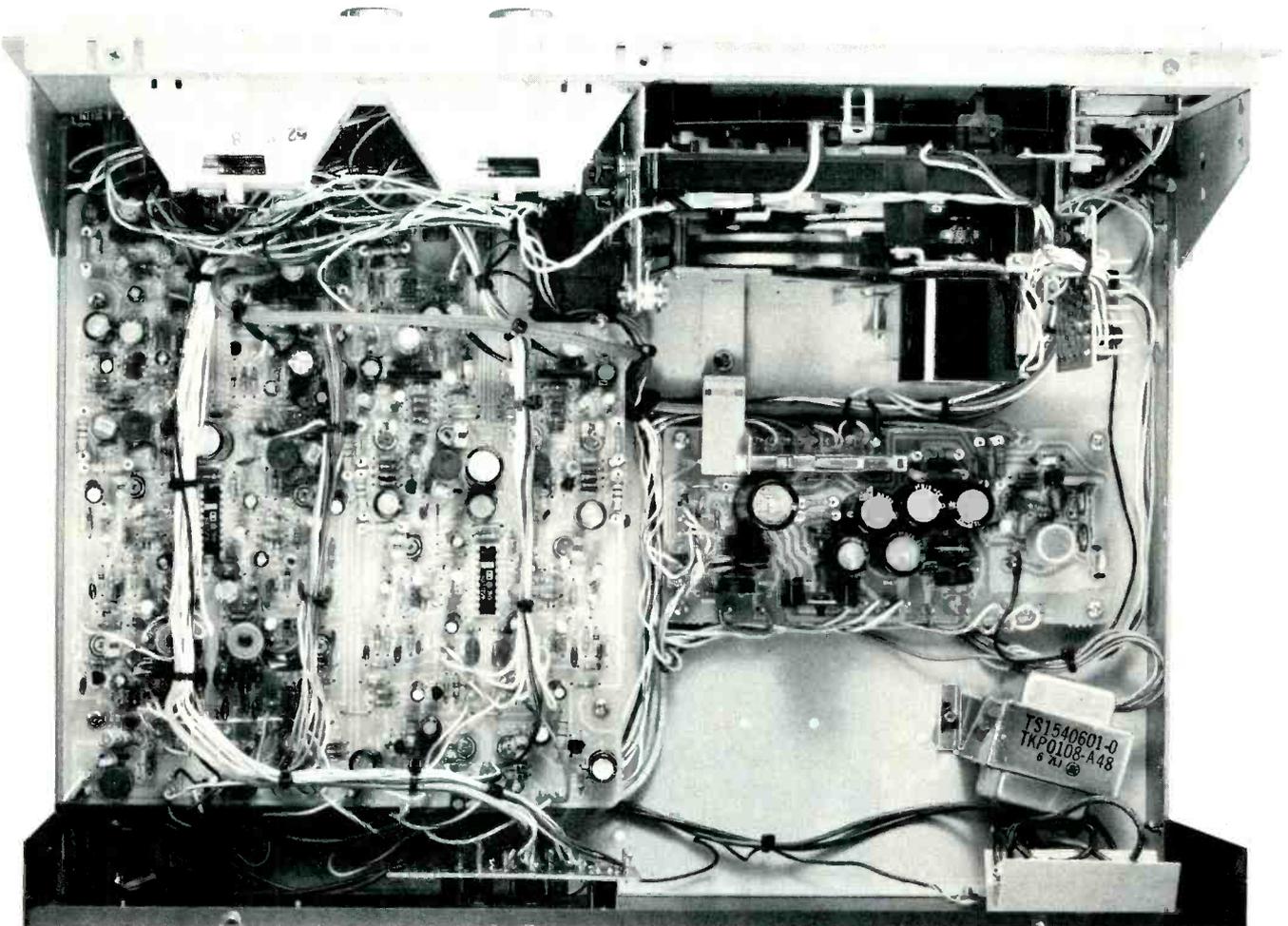


Fig. 2—Frequency response with TDK SA.

were 58.1, 60.8 and 60.4 dBA for the same tapes. With Dolby mode and HDL<sub>3</sub> = 3 per cent, the figures were 66.5, 68.0 and 68.0 dBA for the same order. On a CCIR/ARM basis, the ratios for Sony UHF, Sony FeCr and TDK SA at HDL<sub>3</sub> = 3 per cent were 55.1, 58.5 and 57.7 dB respectively, and 65.2, 68.6 and 67.8 dB with Dolby, for the same order. All in all, excellent performance, especially in light of the amplitude compression noted earlier. Erasure and crosstalk were both more than 80 dB down, and separation was 46 dB, better than many decks.

Mike input sensitivity was 0.19 mV, and input overload was at 60 mV. Line sensitivity was 71 mV, higher than the spec, and overload was at 4.0 volts. Output clipping appeared at a level equivalent to a meter indication of +15. The master



# the unreel deck



**The AIWA AD-6900U. Super specs and sound quality we defy any reel-to-reel to beat. Plus a lot of extras.**

For openers, the AD-6900U delivers a frequency response of 20 to 20,000 Hz and an S/N Ratio of 68 dB using FeCr tape with Dolby\* on. And only 0.04% WOW and FLUTTER (WRMS). Great numbers, but there's more.

**The exclusive AIWA Flat Response Tuning System (FRTS) gets sensational sound out of any kind of tape on the market.**

With just the push of a button, FRTS will use its own circuitry to measure the precise bias level of any kind of tape and adjust for the flattest possible response. And with the built-

in 400 Hz and 8 kHz oscillators, the AD-6900U offers the most precise test recording possible, so you know exactly what to expect before you record. Coupled with AIWA's exclusive combination 3-head V-cut design, you can expect absolute optimum results in recording, playback and test.



Exclusive AIWA 3 head V-cut design

**The AD-6900U features Full Logic operation and exclusive Double Needle Meters.**

Full logic feather-touch push button controls and dual motor operation make the going easy, and the feather-touch operation with Cue and Review can't be found on any other cassette deck. And no other reel-to-reel or cassette deck offers Double Needle Meters that combine both VU and Peak functions on each meter.

**Plus a full array of extras, including AIWA's exclusive SYNCHRO-RECORD.**

When you use the AD-6900U with AIWA's AP-2200 turntable, Synchro-Record activates recording automatically when the record is cued, and stops when the tone arm lifts. Mic/line mixing, oil-damped cassette ejection, Double-Dolby Noise Reduction with fully adjustable calibration, optional RC-10 remote con-



RC-10 Remote Control

trol, low profile design and your choice of rich wood side panels or tough rack-mount handles make this deck an unparalleled value.

The AD-6900U is the absolute deck. When you hear it, when you use it, you'll agree it's UNREEL.

## AIWA®

Distributed in the U.S. by: **AIWA AMERICA INC.**, 35 Oxford Drive, Moonachie, New Jersey 07074 • Distributed in Canada by: **SHIRO (CANADA) LTD.**  
\*Dolby is a trademark of Dolby Laboratories, Inc.

Enter No. 12 on Reader Service Card

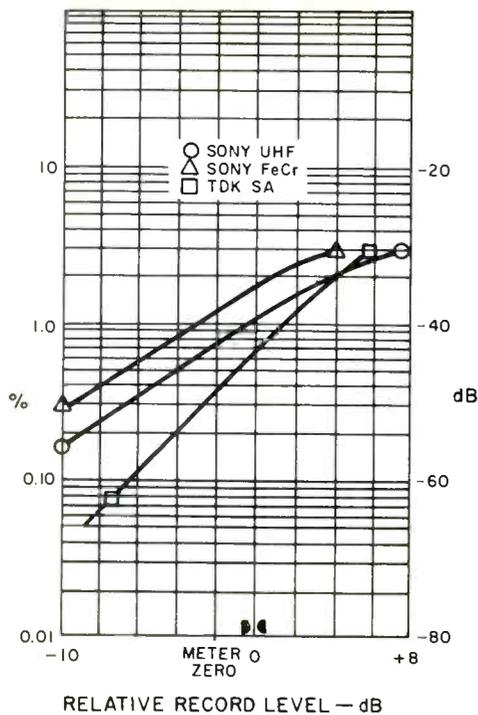


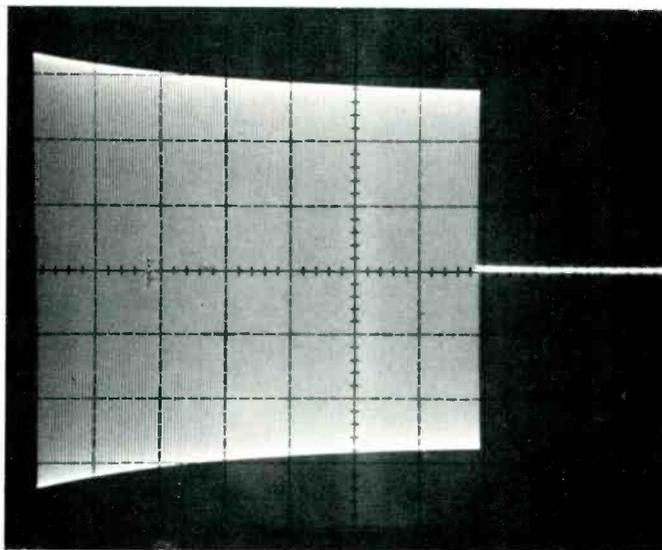
Fig. 3—Percentage of third harmonic distortion vs. 1-kHz record level with Sony UHF, Sony FeCr, and TDK SA.

88

input level pot sections tracked within a dB down 55 dB from maximum setting. The mike and line level pots also tracked very well. The line output levels were 640 mV at meter zero, 770 mV at Dolby reference (+2 meter). The headphone output was 39 mV with 8-ohm loading, a little under the specified 43 mV, but more than adequate for all the phones tried. In fact, the lack of an output pot made the use of sensitive phones impossible because of the high levels. The frequency response of the level meters met VU standards, but the action was a little sluggish, getting to just -2 with the standard 300-mS burst. The meters read high with below zero input levels and read low with above zero signals, but with adequate accuracy. The peak indicator thresholds were at +3 with a 1-kHz CW input. They were still turning on with a tone burst that was just one cycle of 1 kHz, excellent response. The limiter threshold was at a somewhat low -2 on the meters. Even very high-level signals were reduced to

meter zero, perhaps more than necessary. A 140-mS burst with a CW level 15 dB above meter zero was limited to +2 even at the very start of the burst, with reduction in level to +½ by the end of the burst.

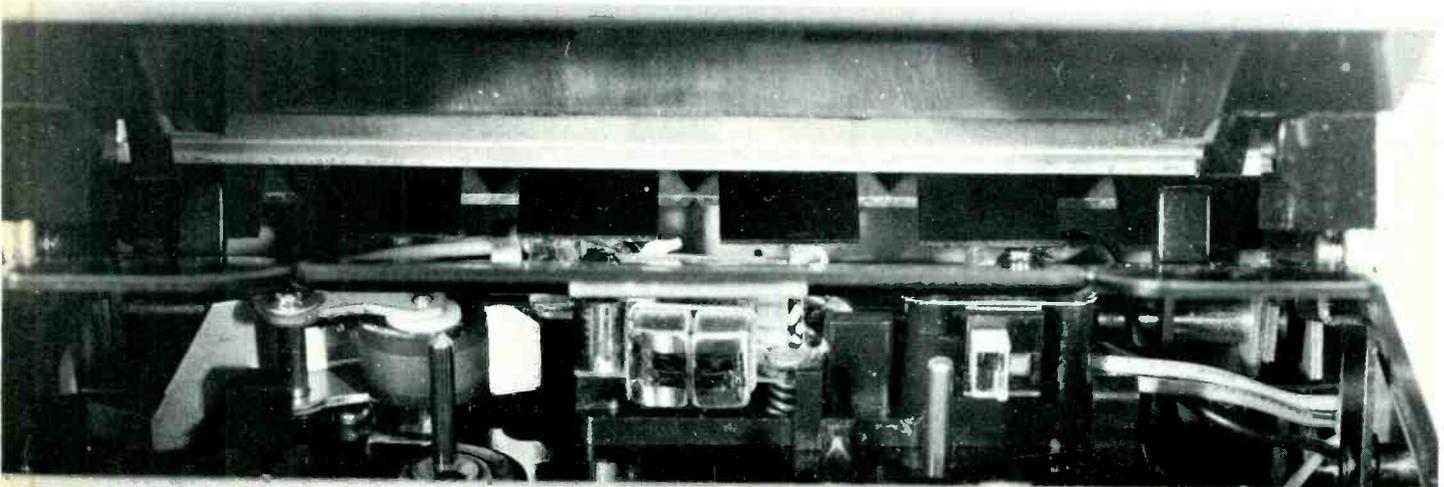
Tape speed was plotted with changes in line power with a 120-V reference. Increases in line voltage on playback caused more of a change in tape speed, but the variation was less than 0.2 percent. Flutter plots were made to both W rms and weighted peak standards. In each case, the recorder was started three different times after tape-motion switching and re-entering play mode. The flutter performance was consistent with typical values of 0.05 percent W rms and 0.08 percent wtd pk, meeting its tight specification. The average wind time was 97 seconds, within spec, but a little on the slow side.



Action of the 5030's limiter.

#### In-Use Tests

Cassette loading and unloading and head cleaning were all easy tasks. The medium pressure required to actuate the tape-motion levers was much lower than many decks with the same approach. The combination of input pots, including the master, and the excellent peak indicators facilitated setting and adjusting levels. Meter action appeared to be acceptable, although tests had shown it a bit sluggish according to the standard. The fluorescent scales seemed attractive,



# SOMEDAY, EVERY AMPLIFIER WILL BE HIGH SPEED.



From the people who brought you dual power supplies and DC amplification comes high fidelity's most significant breakthrough in years.

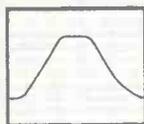
The High Speed Transistor from Kenwood. An improvement so important that it will actually change the way you evaluate amplifiers. An improvement that will be part of every amplifier that claims to be state of the art.

Today, only Kenwood has it. Because Kenwood developed it.

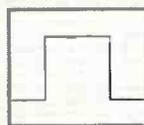
Our engineers discovered that even with exceedingly low harmonic distortion, amplifiers typically lack the ability to react quickly enough to an input signal, particularly at the mid and upper frequencies. This is called transient intermodulation distortion (TIM).

The result can be seen on an oscilloscope as a square wave that's distorted. And heard as poor spatial imaging and loss of detail. While some manufacturers have dealt with a square wave's rise time, only Kenwood High Speed Transistors produce high frequency square waves that decay as fast as they rise.

That's because Kenwood High Speed Transistors



*Pulse waveform  
response of a  
conventional  
amplifier.*



*Pulse waveform  
response of  
Hi-Speed  
amplifier.*

allow a much faster change in voltage (slew rate) than ever before. So no matter what the music demands, the amplifier can match it exactly.

What this means to you is depth and definition that will take your breath away. High frequencies are completely clear and totally non-fatiguing. You'll hear each violin individually in a string section. Each audible harmonic of a single piano note. Even the separate handclaps in recorded applause.

High Speed Transistors are used for the first time in our Audio Purist Group, shown above. Because it takes a very sophisticated and demanding listener to appreciate this new technology.

We're convinced that in a world of compromise, some people still demand the very latest state of the art. Building high fidelity equipment for them will always be our commitment. For more information and complete technical specifications, please write us.

**HI-SPEED™**

*Hear the future of high fidelity.*



**KENWOOD®**

Kenwood, P.O. Box 6213, Carson, CA 90749. In Canada: Magnasonic Canada, Ltd.

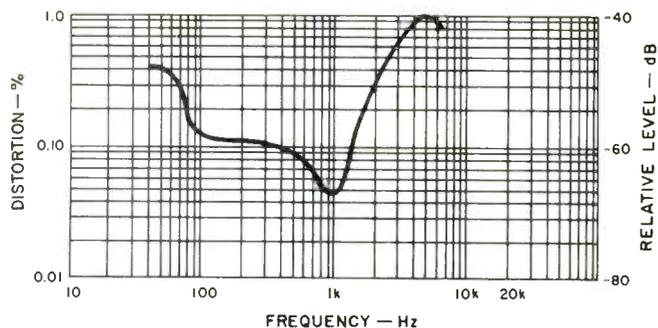


Fig. 4—Level of third harmonic distortion vs. frequency at 10 dB below Dolby level using TDK SA.

but were a little difficult to use with low-level illumination. The lack of an output pot made *Normal/Tape Play* matching impossible in the evaluation monitor system.

The instruction book is very well written with pertinent and lucid comments and excellent illustrations. There is no list of recommended tapes, which may be better than listing many that wouldn't be that good a match. This reviewer, however, encourages manufacturers to let the consumer in on what tapes are used to set the machine up. Alternatively, a statement on the bias provided at various settings would be a guide.

For the great majority of the sources copied and played back, there was nothing to fault in reproduction. Switches between normal and Dolby generated no detectable changes

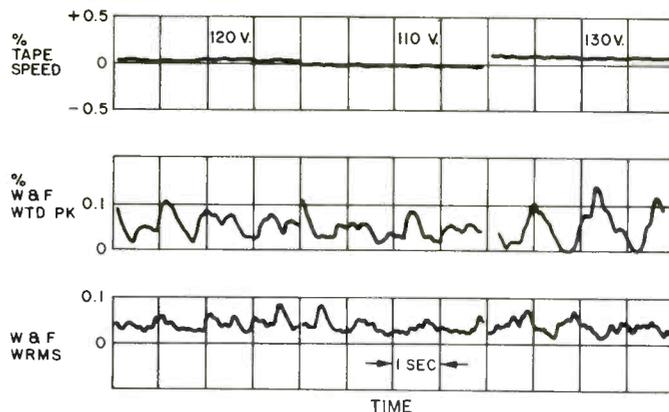
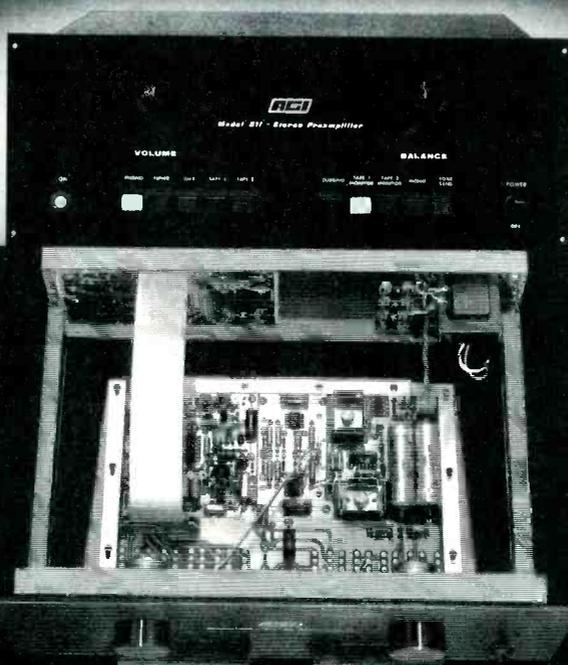


Fig. 5—Tape speed vs. line voltage and flutter.

except for the lower noise in Dolby. With its three-head system, the Marantz 5030B could be checked easily and quickly for any form of overload during the record process. With just one source with a lot of bass, there was some evidence of a change in the playback, judged to be from the dip around 60 Hz. All record, pause, and stop clicks were down at tape noise level, with the exception that the latter stood out a bit in Dolby mode, with its lower noise level. The Marantz cassette deck has a few minor limitations: the lack of an output pot was the most important to me. On the plus side, the 5030B offers tape playback while recording, very flat response over most of the audio range, high signal-to-noise ratios, excellent input mixing/level control, low flutter and phase jitter, and a good limiter.

Howard A. Roberson

# AGI 511A



- Bi-amplified phono stage for unprecedented transient response characteristics
- 250 V/ $\mu$ s phono slew rate
- 0.01  $\mu$ s phono rise time
- Phono noise is cartridge limited (88 dBA below 10 mv)
- Sockets for phono cartridge loading capacitors
- Excellent RFI rejection *without* RFI filters that load the cartridge
- Extended low frequency response for ultra-low phase shift and minimum audio time delay
- Allen-Bradley® mil-spec controls
- Computer correction of volume control for precise tracking
- Metal film resistors and polystyrene capacitors (better than silver mica) for feedback networks
- 20 amp power switch with coined silver contacts
- Highest quality pushbutton switches—bifurcated contacts rated for 500,000 operations

- Six convenience outlets
- 24 karat gold plated beryllium copper contacts for all internal signal connections
- Reliable flat cable wiring
- Single point grounding—no loops
- Less than 0.005% guaranteed maximum distortion (< 0.001% typical) at 5 volts out into 10K ohms or greater
- Drives a 600 ohm load with less than 0.02% IM and THD
- 47 ohm output impedance
- Short circuit protected
- Can drive long cable runs without high frequency loss or distortion, so power amps can be located near speakers for reduced speaker wire losses and improved damping factor
- One hundred hour preamp burn-in before final testing
- Uncompromising craftsmanship
- The only preamp to give you a FULL warranty

Write for the full story—there's lots more

**AUDIO GENERAL**

Dept. A-12, 1631 Easton Road, Willow Grove, Pa. 19090

Enter No. 5 on Reader Service Card



Dolby FM  
restores the detail.

Dolby FM  
means signal  
integrity.

Each process  
applied  
to the signal by  
Dolby FM  
broadcasters is  
precisely  
matched by Dolby  
equipped  
FM receivers.

The listener  
at home can hear  
the signal in  
exactly the form it  
left the studio.

With Dolby FM  
nothing is added—  
or taken away.

 Dolby FM

Dolby Laboratories, Inc.  
731 Sansome Street  
San Francisco, CA 94111  
Telephone (415) 392-0300  
Telex 34409

'Dolby' and the Double-D symbols  
are trademarks of Dolby Laboratories, Inc.

## JVC Model QL-7 Direct-Drive Turntable



92

### MANUFACTURER'S SPECIFICATIONS

**Speeds:** 33 $\frac{1}{3}$  and 45 rpm.

**Motor:** 12-pole, 24 slot, d.c. servo.

**Wow & Flutter:** Less than 0.25 per cent W rms.

**Rumble:** Better than 63 dB (IEC-B).

**Tonearm:** Static balance.

**Tonearm Effective Length:** 254 mm (9.6 in.).

**Tonearm Overhang:** 15 mm (0.6 in.).

**Tracking Force Range:** 0 to 3 gms.

**Dimensions:** 18 $\frac{3}{4}$  in. (47.6 cm) x 15 $\frac{3}{4}$  in. (38.7 cm) x 6 $\frac{1}{4}$  in. (15.9 cm).

**Weight:** 23.8 lbs. (10.8 kg).

**Price:** \$299.95.

When quartz-controlled, single-play, direct-drive turntables first came on the scene, they were extremely expensive, but the increasing demand combined with technological design and production improvements to bring prices down in a rush. An example of this is the JVC QL-7 which costs under \$300.00 and boasts some of the same features and specifications as the super-luxury units costing up to \$1000.00, plus it looks good in the bar-

gain. True, it doesn't have the variable speed facility, but this refinement adds a lot to the cost and, in reality, very few people really need it. Again, there is no digital display, but in terms of wow and flutter, rumble, and general good engineering nothing has been skimmed on.

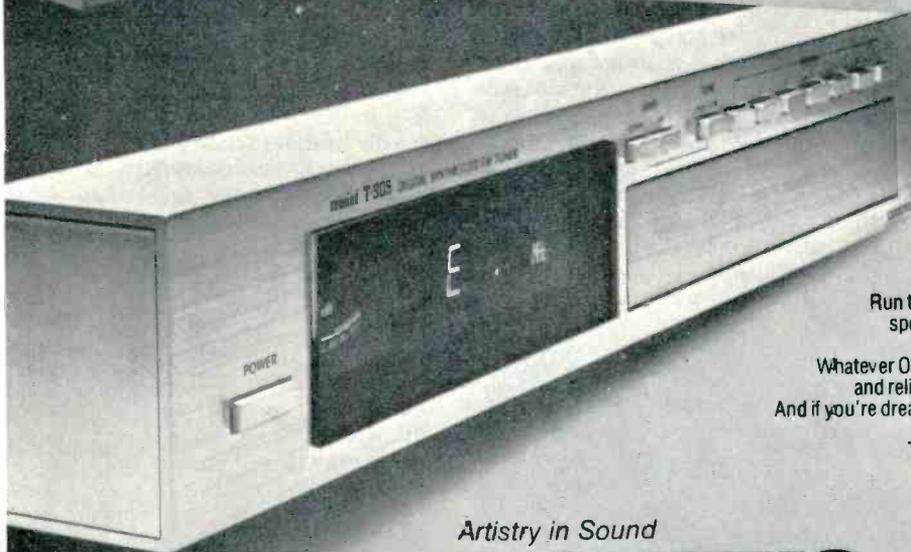
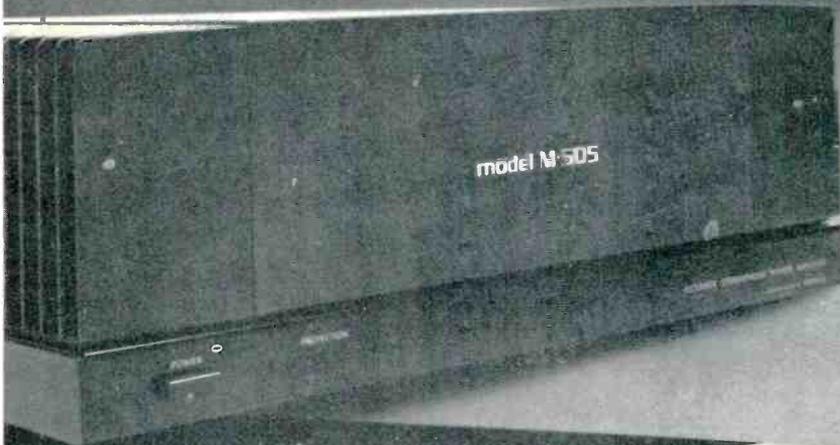
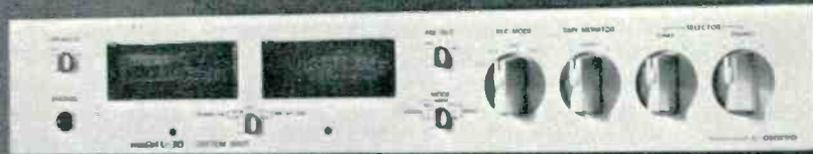
The 12-pole d.c. motor is servo-controlled with a quartz-crystal reference, and an integral signal generator provides the correction pulses. The 4-lb.

die-cast platter is surrounded by a polished, angled ring on which the controls are mounted. The small thumbwheel *On/Off* switch is on the left, and next to it, towards the front, are three tiny contact switches for 33 $\frac{1}{3}$ , 45, and *Stop*. The strobe light is located behind a plastic window at the center, with the relevant markings cut into the side of the platter.

The tonearm is the conventional S-shaped type measuring a bit under 10



# ONKYO QUALITY... OUR DESIGN BASE.



**We make it new.  
We make it right.**

Onkyo as an innovator is constantly probing for new materials and methods for improved performance, high reliability and the best of advanced technology.

Innovation is what gave you Quartz-Locked tuning... the system that's impossible to mistune. Available in our Models TX-4500MKII, TX-6500MKII and TX-8500MKII receivers and in the T-9 tuner.

It also produced the Model TA-633D cassette deck with the exclusive 2-head Accu-Bias system for bias adjustment on a continuous rate rather than fixed bias and Dolby NR\*.

Our search for pure and undistorted sound resulted in the bus feeder line system for absolute minimum impedance which approaches the theoretical zero point for Equivalent Series Resistance, available on all our amplifiers (Models A-5, A-7 and A-10 integrated amp), P-303 preamp and M-505 main amp. Add the U-30 System Selector and E-30 Audio Equalizer for an audio system that is second to none.

To give you the highest quality tuning, we developed the T-909, a true digital synthesized tuner including frequency readout for less than \$1,000.

Run these components through the Onkyo M-160 or M-240 speaker system with oversized woofers for superb sound reproduction.

Whatever Onkyo product you select, you'll find innovation, quality and reliability. They form the design base for Onkyo products. And if you're dreaming of something we don't have yet, chances are it's on the drawing board.

That's how we stay a step ahead of state-of-the-art.

\*Dolby is a trademark of Dolby Laboratories, Inc.

Artistry in Sound

## ONKYO®

Eastern Office: 42-07 20th Avenue, Long Island City, NY 11105 (212) 728-4639

Midwest Office: 935 Sivert Drive, Wood Dale, IL 60191 (312) 595-2970

West Coast Distribution Center: Damark Industries, Inc., 20600 Nordhoff Street, Chatsworth, CA 91311 (213) 998-6501

Canada: Sole Distributor, Tri-Tel Industries, Ltd., Ontario, Canada

Enter No. 40 on Reader Service Card

## AKG P8ES Stereo Cartridge

### MANUFACTURER'S SPECIFICATIONS

**Stylus Description:** Elliptical, 0.2 x 0.7 mil tip radius, and 0.42 mg effective mass.

**Frequency Response:** 10 - 28,000 Hz, measured using B&K QR-2010.

**Output Voltage at 5 cm/sec:** 3.75 mV.

**Tracking Force Range:** 0.75 to 1.25 grams.

**Optimum Tracking Force:** 1.0 gram.

**Compliance:**  $35 \times 10^{-6}$  cm/dyne.

**Channel Separation at 1 kHz:** 35 dB.

**Channel Separation at 10 kHz:** 25 dB.

**Channel Balance:** Within 2 dB.

**Frequency IM Distortion at -6 dB:** 0.5 per cent or less.

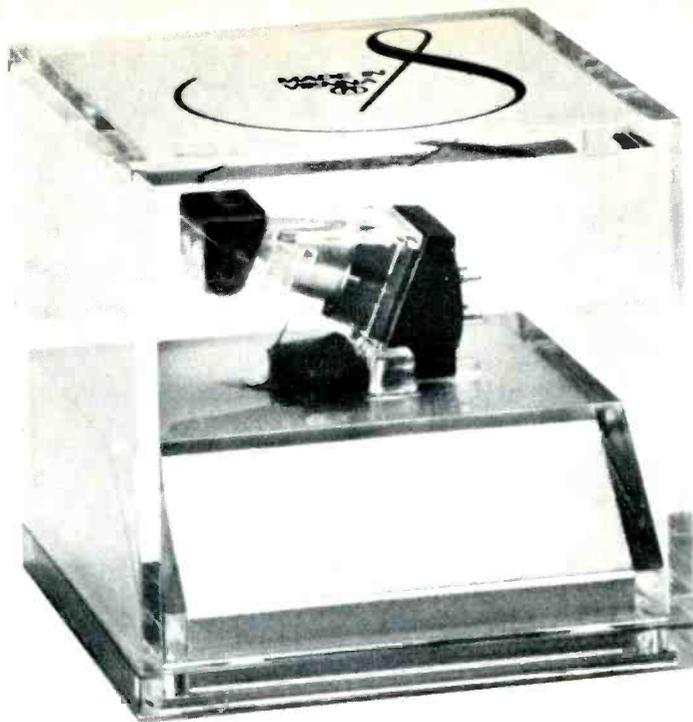
**Impedance:** 860 ohms and 280 mH.

**Optimum Load:** 47,000 ohms and 470 pF.

**Weight:** 5.86 grams.

**Replacement Stylus Assembly:** X8S (elliptical tip).

**Price:** \$135.00.



96

When the name AKG (Vienna, Austria) is mentioned, one automatically thinks of high-class professional microphones of world renown. Today, among other products, AKG manufactures a line of stereo phono cartridges, all using the variable reluctance principle. These cartridges utilize a patented transversal suspension (TS) for the stylus cantilever which is centered symmetrically in a small hole in a very thin, gold-plated metal plate. The plate and the gold-plated soft iron armature are connected to each other by a rubber element which is vulcanized to both metal parts by a special process, resulting in a knife-edge bearing of incredibly small size. The knife-edge pivot is claimed to suppress torsional and axial movement so that no spurious signals are generated. Due to the design's complete symmetry, the same mechanical conditions exist for transverse excitation in all directions. The large permanent magnet with high flux density in the air gap is not a part of the moving stylus assembly, thus reducing the effective mass of the stylus.

The overall appearance of the line of cartridges is similar, with the model P8ES being at the top of the line. The cartridge comes packed in a plastic cube. The necessary hardware is located in the bottom of the cube and included a screwdriver in the model we tested, the AKG P8ES. Also included is an individual response curve for the cartridge and directions for mounting the cartridge.

The shape of the cartridge bottom is such that it must be absolutely parallel to the record to avoid rubbing the record surface, particularly on warped records. Although the supplied wedge is meant to be used to mount the cartridge in a record-changer arm, we found that it may have to be used in a single-play tone arm if the arm cannot be adjusted so the bottom of the cartridge does not rub the record surface.

### Measurements

As is our practice, measurements are made on both channels, but only the left channel is reported. During the test period the average temperature was  $75^{\circ}\text{F} \pm 1^{\circ}$  ( $23.33^{\circ}\text{C}$ ) and the relative humidity  $65$  per cent  $\pm 3$  per cent.

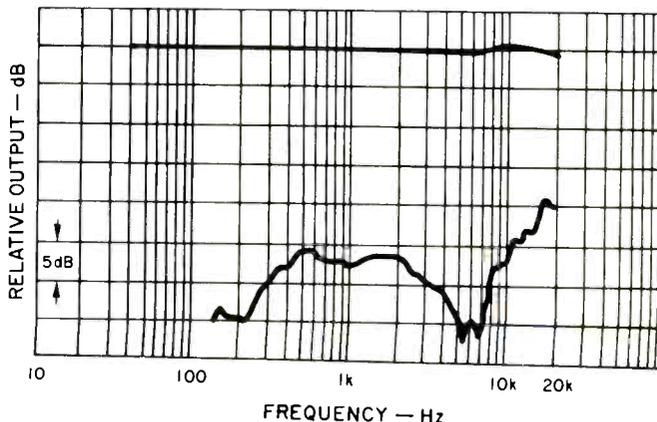
Frequency response, using the Columbia STR-100 test record and our reference tonearm, an Audio-Technica AT-1009, mounted on a Technics SP-10 turntable, is flat within a  $-0.5$  dB from 40 Hz to 6 kHz, then starts to slowly rise to  $+2$  dB at 10 kHz, finally descending to  $-1$  dB at 20 kHz. The

optimum tracking force for the cartridge we tested was at its maximum recommended tracking force, 1.25 grams. The optimum anti-skating force was 2.0 grams. Separation was superb, being 21.5 dB at 1 kHz, 37 dB at 5.6 kHz, 28 dB at 10 kHz, and 19 dB at 20 kHz. The load resistance was 47 kilohms and 470 pF capacitance. Square-wave response shows a single cycle of overshoot, but no ringing. This cartridge has one of the lowest IM distortions we ever measured.

The following test records were used in making the reported measurements: Technics SFC-TR100; Micro-Acoustics TT-2002; Shure TTR-103, TTR-109, TTR-110, TTR-115; Columbia STR-100, STR-112, SQT-1100; JVC TRS-1007; Stereo Review SR-12; Deutsches HiFi No. 2, and the Nippon Columbia Audio Technical Record (PCM) XL-7004.

Wt. 5.95 g; d.c. res. 970 ohms; ind. 320 mH; opt. tracking force 1.25 g; opt. anti-skating force 2.0 g; output 0.68 mV/cm/sec; IM distortion (4:1)  $+9$  dB lateral, 200/4000: 1.1%,  $+6$  dB vertical, 200/4000: 1.3%; crosstalk (using Shure TTR-109)  $-35$  dB; ch. bal. 0.75 dB; trackability: high freq. (10.8 kHz pulsed) 30 cm/sec, mid-freq. (1000 + 1500 Hz, lat. cut) 31.5 cm/sec, low freq. (400 + 4000 Hz, lat. cut) 24 cm/sec; Deutsches HiFi No. 2, 300-Hz test band tracked cleanly to 86 microns (0.0086 cm) lateral and 55.4 microns (0.00554 cm) vertical. This is extremely good and very few cartridges can track these bands. The arm-cartridge resonance curve showed a resonance peak at 6 Hz with an amplitude of 7.5 dB. Although the peak resonance frequency is a little low with the Audio-

Fig. 1 — Frequency response.



# THINK OF THEM AS \$2,000 SPEAKERS YOU WEAR.



Model 424 shown.

It's a fact. If you paid \$2,000 or more for the very best high fidelity speakers, you'd still only *approach* the sound of Sennheiser Open-Aire® headphones. Because even the best loudspeakers must contend with room reflections and resonances, resulting in less-than-perfect stereo separation and uneven response. As well as the limitations of high-power reproduction, which introduces other types of distortion.

By bringing musical reproduction closer to your ears — without enclosing them — Sennheiser engineers

developed a unique electro-acoustic design combining comfort with exceptional sound: A lighter diaphragm, operating in a free-air environment, yields superior response to musical transients without sacrificing bass. High-frequency response is also dramatically improved, with a

new level of clarity and instrumental definition. Separation is excellent. And yet with all these advantages, Sennheiser headphones are also extremely light in weight: the 'heaviest' weighing just 6½ ounces!

Critics have given Sennheiser the highest praise ever put into print. Recording studios, broadcast stations and film crews rely on them for monitoring. NASA used them for critical applications aboard Skylab. Even competitors have flattered us with imitations.

One listen is worth a thousand words. Visit your dealer and hear how good music can sound. Compare our headphones to any others (or even to \$2,000 speakers). The results should be a pleasant surprise... discovering how much more performance just a few dollars more will buy.

A free "Top Quality" T-shirt with every pair of Sennheisers you buy...

Sennheiser Electronic Corporation  
10 West 37th Street  
New York, N.Y. 10018

I've bought a pair of Sennheiser headphones within the last 90 days and enclosed my dated warranty card. Please send me a free Sennheiser T-shirt.

Please check size:  
Adults:  medium  large  X-large  
Children:  8-10  12-14



NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
Offer expires January 31, 1979 Please allow 4 weeks for delivery

**SENNHEISER**

ELECTRONIC CORPORATION  
10 West 37th Street, New York 10018 (212) 239-0190  
Manufacturing Plant: Bissendorf/Hannover, West Germany

Technica AT-1009 arm, we could not detect any adverse effects during the listening period.

The Micro-Acoustics Test Record TT-2002 was used to check the tracking and transient ability. The AKG P8ES cartridge encountered no difficulty in playing all the tracking ability bands. The percussion levels check the cartridge for both vertical and lateral tracking ability. The transient ability of the P8ES is excellent since the computer-generated high, low, and high/low mixed frequencies presented no problem to this cartridge.

The P8ES performed superbly on all bands of the Shure Audio Obstacle Course Era III (TTR-110). With the newer Shure Audio Obstacle Course Era IV (TTR-115) test record, the tracking ability of the P8ES did not quite pass level 5 (+12 dB above the reference level) of the flute and flute-bell test. These are one of the most severe high-frequency trackability tests to be found and very few cartridges will track beyond level 4 of this test for it is truly an "obstacle course." In general, the results clearly point out the excellence of the transient and tracking ability of the AKG P8ES phono cartridge. In this aspect, the P8ES does not have to take second place to any other cartridge known to us.

### Listening Evaluation

Our listening tests are performed both prior to actually testing the cartridge parameters and again after all tests have been completed. The equipment used for the listening evaluation is identical to that used in the report last month. When we first heard some of our records played with the AKG P8ES cartridge, we were surprised by the transparency of the sound and it was probably due to the low IM distortion of the cartridge. The P8ES has excellent sonic clarity and bass response. We did not notice any high frequency effects from

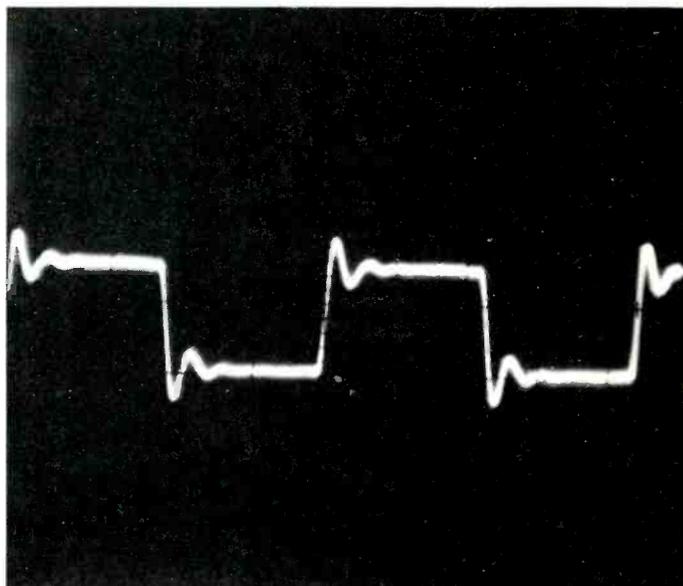


Fig. 2 — Response to 1-kHz square wave.

the 2 dB peak at 10 kHz. The P8ES did not appear to introduce either a sound of its own or coloration.

In conclusion, the AKG P8ES had no difficulty playing the listed or any other record in our collection. It is a cartridge which plays cleanly and one of the best in terms of tracking ability. Our conclusion is that the P8ES ranks among the top cartridges with very few others being its equal. B. V. Pisha

Enter No. 93 on Reader Service Card

### Reference Recordings

A rigorous listening evaluation was conducted utilizing the specific records listed below as well as many of the records listed in past reports. These excellent recordings demonstrate quite effectively the ability of the P8ES to reproduce difficult as well as high level recordings, such as the high velocities present on many of the direct-to-disc recordings, without adding anything of its own to the music. The AKG P8ES is especially superb in reproducing the singing voice, having a clarity and naturalness that is seldom found.

#### Direct to Disc

Tchaikovsky: *Capriccio italien*, op. 45; Rimsky-Korsakov:

*Capriccio espagnol*, op. 34, The Boston Pops, Fiedler — Crystal Clear CCS 7003.

Creation: *Super Rock at the Highest Voltage* — Toshiba-EMI LF 95016.

J. Fukamachi: *Sgt. Pepper's Lonely Hearts Club Band* — Toshiba-EMI LF-95014.

E. Kitamura: *30 Years in 30 Minutes* — Toshiba-EMI LF-95012. (These Toshiba-EMI discs are distributed by Audio-Technica.)

Bill Berry & Ellington All-Stars: *For Duke* — M&K Sound RT-101 (M&K Sound Corp., 8719 Wilshire Blvd., Beverly Hills, Calif. 90211.)

Spectrum: *Direct Flight* — Direct-Disk DD-104. (Direct-Disk Labs, 16 Music Circle Sound, Nashville, Tenn. 37203.)

#### Pulse Code Modulation (PCM, Stereo)

B. H. Soran-Bushi: *Billy Harper* — Denon YX-7522-ND.

Bach: *Organ Concert, K. Vad* — Denon OX-7048-ND.

Mussorgsky: *Pictures at an Exhibition*; Ravel: *Pavane pour une infante defunte*, Tokyo Metropolitan Symphony Orches-

tra, Fremaux — Denon OX-7072-ND. (These Denon PCM records are distributed through American Audioport dealers.)

#### Stereo

Beethoven: *Symphony No. 3 in E-flat Major ("Eroica")*, Chicago Symphony Orchestra, Solti — London CS 7049.

Beethoven: *Missa Solemnis*, Chicago Symphony Orchestra and Chorus, Solti — London OSA 12111.

Bruckner: *Te Deum; Mass No. 2 in E minor*, Vienna Philharmonic Orchestra, Mehta — London OS 26506.

Floyd Cramer: *Looking for Mr. Goodbar* — RCA APL 1-2644.

Bartok: *Violin Concerto No. 2*, Kyung-wha Chung, violin, London Philharmonic Orchestra, Solti — London CS 7023.

Wagner: *Meistersinger* (Act 1); *Tristan* (Prelude), Chicago Symphony Orchestra, Solti — London CS 7078.

Pavarotti: *Bravo Pavarotti! His Great American Triumphs* — London PAV-2001-2.

*Music for Percussion, Vol. 1*, Tristan Fry Percussion Ensemble, Gardiner — Gale GMFD1-76-004. (This excellent recording, distributed by Audio-Technica through their dealers, rivals the better PCM and direct-to-disc records.)

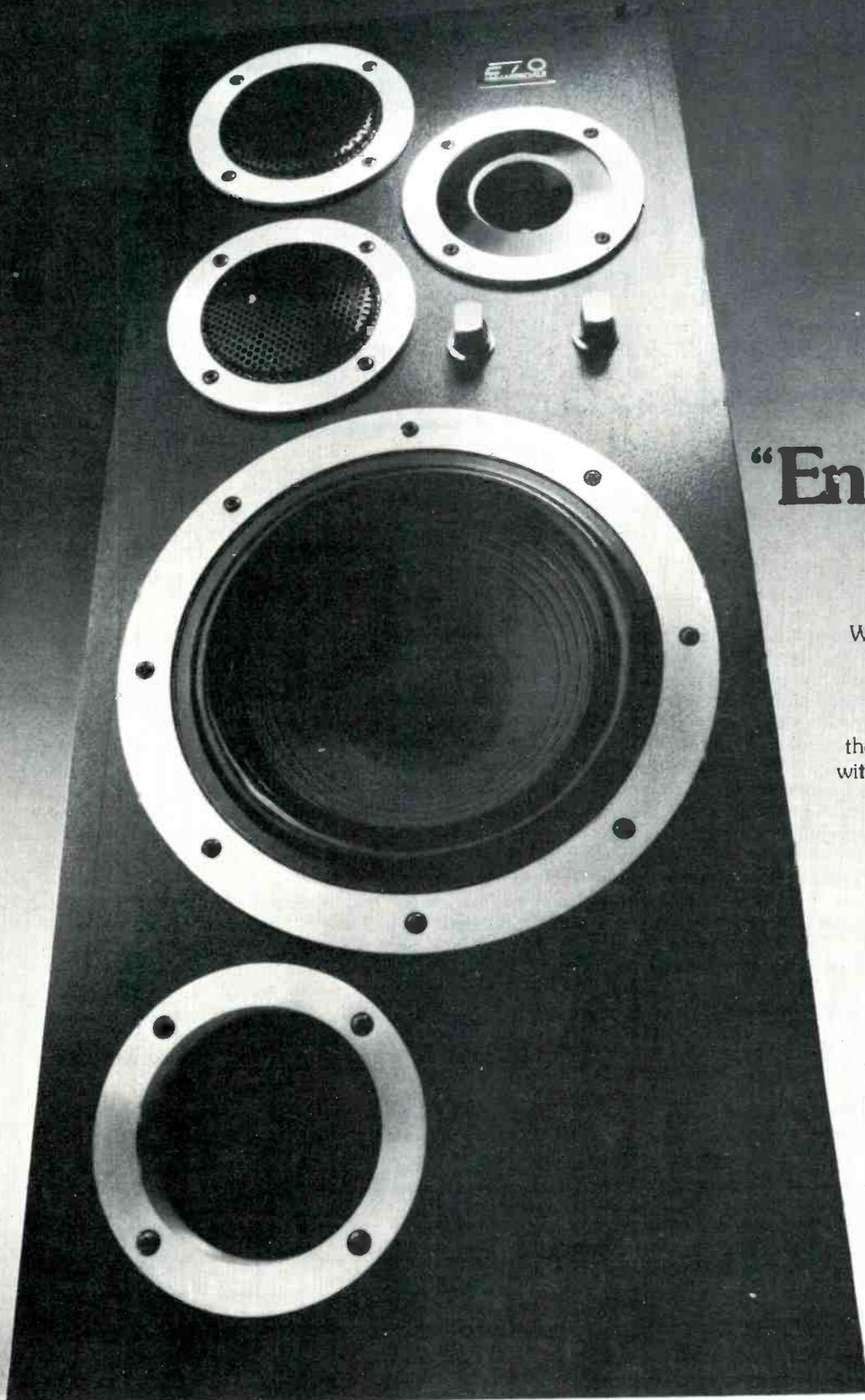
*Check Up Your Sounds, Vol. 1*, Audio Symphony — RCA (Japan) RVL-1. (Also distributed through Audio-Technica, this highly recommended record should be owned by every audiophile to evaluate their system).

#### Quadraphonic-SQ

Enoch Light & Light Brigade: *New Recordings of the Big Band Hits of the 30s, 40s, and 50s* — Project Three PR2-6005/6 Q.

Donizetti: *Gemma di Verger*, Caballe — Columbia M3-34575.

*Annie*, Original Cast Recording — Columbia PS-34712.



## “Enormously Efficient.”

The computer-optimized Wharfedale E's. Beautifully designed and crafted. For the sophisticated connoisseur of sound.

Unusually efficient (94dB/W/m), the E's are clean and easy-to-listen-to, with notably good transient response. Distortion is inordinately—and inaudibly—low.

### “Exceptionally flat...”

Response is wide and flat (50-18,000Hz,  $\pm 3$ dB for the E-70), with exceptional bass performance.

That's why audio experts acclaim the E's. Why audiophiles adore them.

The Wharfedale E-70's and E-50's come in matched, hand-finished, walnut-veneer pairs. Audition the E's and our complete line of high-quality loudspeakers at your Wharfedale dealer today.

We know you'll be enormously impressed.

**W**  
WHARFEDALE



RANK HiFi Inc., 20 Bushes Lane, Elmwood Park, New Jersey 07407 (201) 791-7888

Enter No. 49 on Reader Service Card

## Aiwa Model AD-6550 Stereo Cassette Deck



### MANUFACTURER'S SPECIFICATIONS

**Frequency Response:** 20 Hz to 15 kHz, 20 Hz to 17 kHz with FeCr and CrO<sub>2</sub> tapes.  
**S/N Ratio:** 65 dB with FeCr tape and Dolby NR.

**Input Sensitivity:** Mike, 0.3 mV; Line, 50 mV.

**Output Level:** Line, 775 mV.

**Wow & Flutter:** 0.05 W rms.

**FF & RWD Times:** 90 seconds for C-60 cassettes.

**Dimensions:** 16 <sup>9</sup>/<sub>16</sub> in. (42 cm) W x 5 <sup>15</sup>/<sub>16</sub> in. (15 cm) H x 13 in. (33 cm) D.

**Weight:** 16.5 lbs. (7.47 kg).

**Price:** \$450.00.

100

The Aiwa AD-6550 is an attractive, smooth-working cassette deck. The friction roller-damped door of this front loader allows easy loading, and, with removal of the front glass, maintenance tasks are quite simple. The good-sized tape-motion control levers provide the essential interlocking, but also provide some conveniences in operation. *Review* and *Cue* modes are obtained with the *Rewind* and *FFWD* controls when in *Play*. It is also possible to go directly from either wind mode to *Play*. The same lever performs both stop and eject functions; a second push is required for ejection when the tape is moving. The pause lever also performs as the timer start switch, possible in either play or record. To the left of the illuminated cassette compartment are the power switch and the jacks for microphones, headphones, and a DIN-type plug. Between the two large, well-illuminated meters are peak indicators for +3 (yellow) and +7 (red). The indicator lamps for record mode and Dolby NR are to the left, as is the counter.

Pushbutton switches control counter reset, memory *On/Off*, left meter function (VU or tape time remaining), line or microphone input, and Dolby NR. The dual concentric record-level

pots have very large knobs with fine knurling and a smooth friction clutch, producing a high-quality feel. The smaller output level control also has fine knurling and a smooth feel. The tape selector switches provide three settings of bias and EQ. Bias can be set for LH (low noise), FeCr, or CrO<sub>2</sub> tape types. The EQ settings are labelled 120, 70, and 70 microseconds, so the switches will line up for the great majority of cases. Associated with the LH bias position is an adjustment pot which can be set anywhere from 90 to 110 percent of normal bias, with a detent at 106 percent. This is a very useful feature for any user who might use tape that does not match a fixed setting. The particular implementation by Aiwa is well thought out in the range of bias offered and in the use of a small knurled-bevel knob. This design detail allows adjustments to be made when needed, but is immune to inadvertent changes.

The line-in and line-out phono jacks are on the rear panel along with a ground post and a record player sync jack. The latter is for connection to Aiwa turntables which will release the deck's *Pause* when the tonearm sets down. The majority of the circuitry is on one large PCB, with a few other PCBs of

Fig. 1—Record/playback response with BASF Studio tape in Normal and Dolby N/R modes.

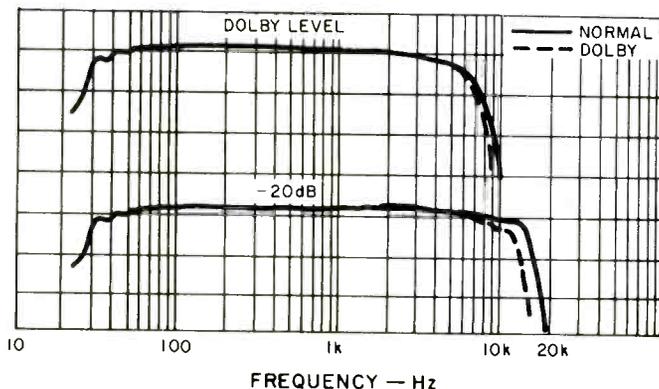
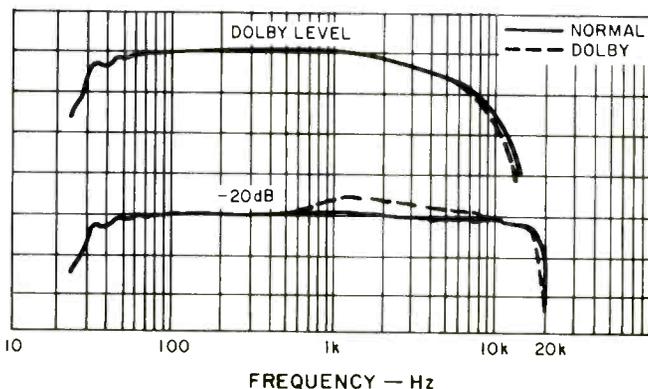


Fig. 2—Record/playback response of Scotch Master III FeCr tape in Normal and Dolby N/R modes.



# This new tuner, amplifier and turntable are all by LUX.

We'll leave the speakers up to you.

The tuner and integrated amplifier are from LUX's new Studio Standard Series, our newest and most modestly priced line of separates. Their features and performance, however, are anything but modest.

The T-4 tuner, for example, has LUX's exclusive Accutouch tuning system. The knob physically locks at every station that exceeds the muting threshold—from 5 to 300  $\mu$ V. LUX's closed-lock-loop tuning circuit is precisely referenced to the station's carrier frequency for lowest-distortion reception. And the i.f. bandwidth is adjustable—wide (normal) or narrow—to accommo-

date station density throughout the FM band.

The L-5 integrated amplifier has a DC direct-coupled power amplifier section with frequency response extending from 5 Hz to 100 kHz, +0, -1 dB. Bass and treble tone controls have switchable turnover frequencies, plus total tone defeat. Subsonic filter in addition to low and high-cut filters. And when tape decks are not in use, a special switch actually disconnects them from the amplifier, preventing loading which causes preamp distortion.

The PD-272 is LUX's lowest-priced turntable. Its servo-controlled

direct-drive brushless DC motor is totally free of the cogging (pulsing) that plagues many other direct-drive motors. And the straight, statically-balanced tonearm has a nested tube construction and internal damping that deal very effectively with resonance. Another feature: the vertical pivots extend through the arm, minimizing lateral play.

Altogether, these three components will deliver a clean, virtually distortion-free signal to your speakers. We'll leave that final decision to you and your LUX dealer—whose taste is as high in speakers as in electronics and turntables.

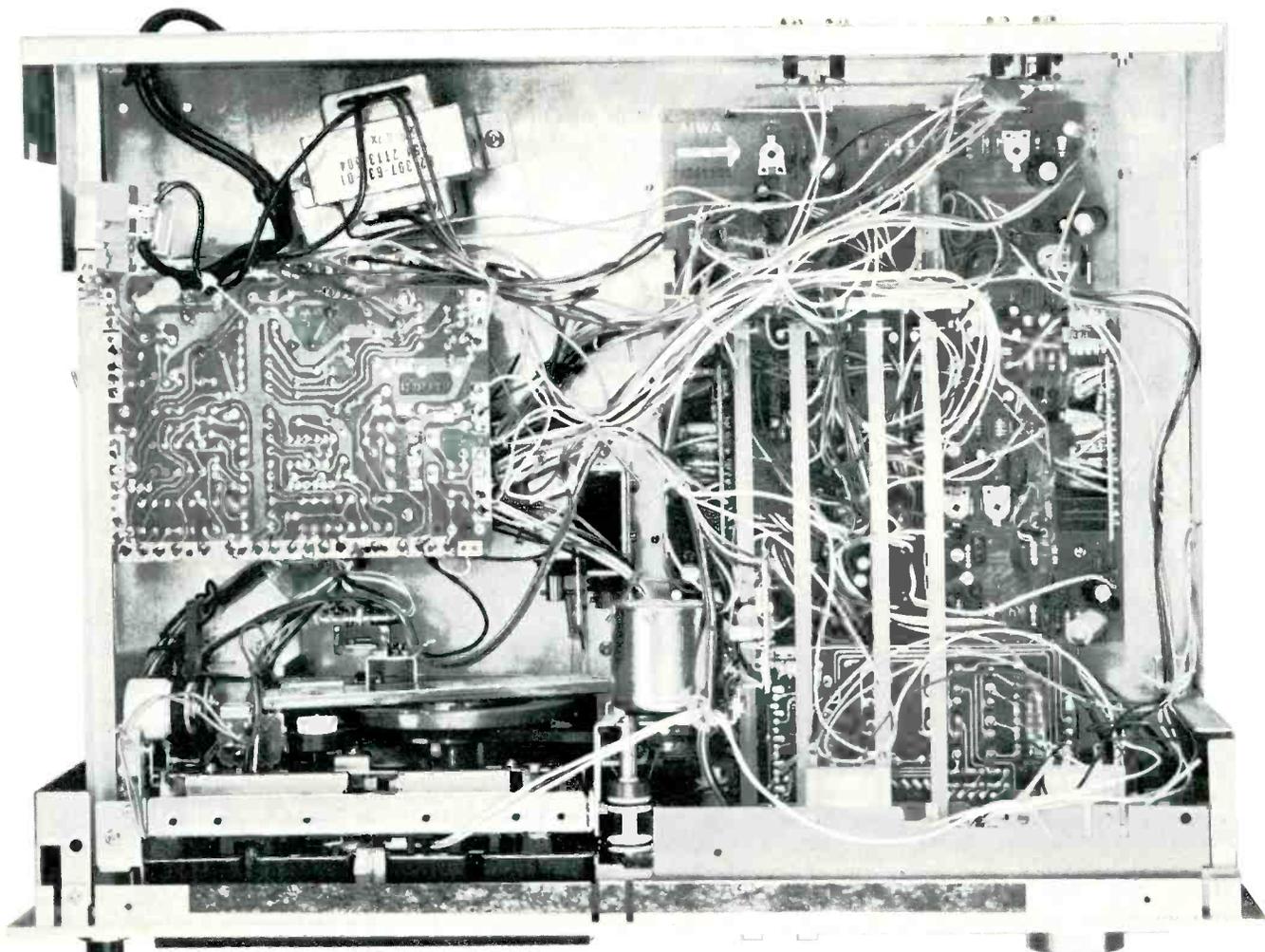
## LUX Audio of America, Ltd.

160 Dupont Street, Plainview, New York 11803 • In Canada: White Electronics Development Corp., Ontario

**Luxman T-4 AM/FM stereo tuner.** Usable sensitivity, 10.3 dBf (1.8  $\mu$ V); 50-dB quieting sensitivity, 14.7 dBf (2.8  $\mu$ V). S/N: 75 dB. Alternate-channel selectivity, 85 dB (narrow), 40 dB (wide). THD (at 1 kHz) 0.08% (wide). (Luxman T-2, AM/FM stereo tuner, similar to T-4, less Accutouch and CLL.)

**Luxman L-5 integrated amplifier.** 60 watts per channel minimum continuous power into 8 ohms, 20-20,000 Hz, with no more than 0.03% total harmonic or intermodulation distortion. Damping factor: 80 at 1 kHz (8 ohms). Phono signal-to-noise ratio better than 92 dB (IHF-A ref 10 mV input). (Luxman L-3, similar, but 35 watts per channel, 20 Hz-20 kHz, 0.04% THD.)

**Luxman PD-272.** 12" die-cast aluminum platter with high density mat, 3.96 lbs. Detachable hinged cover, adjustable isolating feet. Separate pitch control ( $\pm 4\%$ ), each speed. Rumble: better than 70 dB (DIN B); wow and flutter: better than 0.03% (WRMS).



faces are well illuminated and of good size, but they seemed a little "busy." Part of that impression was probably from the inclusion of the tape-time-remaining scales on the left meter, which were proven to be accurate for this purpose. The thresholds of the "+3" and "+7" indicators were within 0.5 dB with a CW signal. With very short tone bursts, the turn-on points remained substantially the same, which shows excellent design, and is not as common as it ought to be.

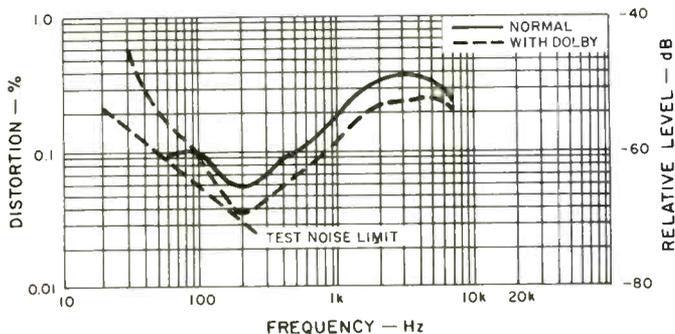
Tape speed was about one per cent fast, and there was no change in speed from 100 to 130 V line power. Tape speed variations and wow & flutter were measured at the beginning, middle, and end of a cassette (see Fig. 6). There were some slight variations in tape speed, but nothing ever occurred that was audible. The flutter was always lower than the specified 0.05 per cent W rms with the exception of a couple peaks at the beginning of the cassette. A typical value was about 0.03 per cent W rms, and just 0.035 per cent Wtd

Peak, superb performance for a cassette deck. Winding for a C-60 cassette took 90 seconds, on the slow side, albeit done smoothly.

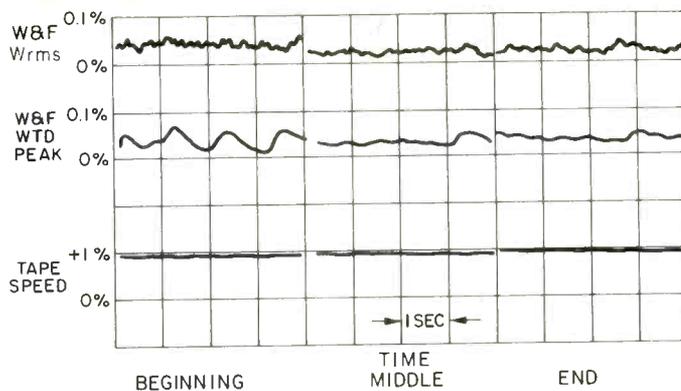
#### Listening & Use Tests

Cassette loading and unloading was very easy with the AD-6550 deck. The accessibility for maintenance tasks was fairly good with the door open and was very good with the heavy glass cover off, easily removed by loosening two thumb screws. The fine knurling of the pots and the flats at the index points, in conjunction with the smooth rotation, gave a continuing impression of high quality. The lever action of the bias and EQ switches was quite good, and there were no miscues with the button switches. All tape motion controls worked smoothly and without any sort of failure, despite the purposeful punching around by this reviewer. It was discovered that it was possible to go directly from either





**Fig. 5—Third harmonic distortion vs. frequency for normal and Dolby modes at 10 dB below Dolby level (200 nWb/m) with Scotch Master III FeCr tape.**



**Fig. 6—Tape speed variation and wow & flutter measured at the beginning, middle, and end of a cassette.**

wind mode to *Play*. It was smoothest when *Play* was pushed slowly, which automatically stopped the tape before resuming tape motion. Timer start worked as stated with use of the pause control. The LH (low-noise tape) bias control was essential in matching some of the tapes tried, and the range provided was sufficient to peak up the performance of every tape formulation checked. For the potential user who might want to try different tape types, this is one of the best features that Aiwa has included. As misadjustment of the bias control can be very detrimental, the bevel-headed knob was poked and bumped to make certain of its resistance to inadvertent changes. No changes were detected, proving the good human engineering for this function.

The text and illustrations of the instruction book were good, in general, but there should be more detail on setting

bias. Some illustrations had a confusing layout, and there was no schematic. Recording various sources for listening tests was greatly facilitated with the VU meters and the +3 and +7 peak indicators, which emitted bright flashes even for very short transients. Record levels were set lower than originally planned, but the playback was quite noise-free in Dolby mode. At these levels, the tape saturation effects shown in the 200 nWb/m record/playback response for Scotch Master III were not apparent. The general impression was of smooth reproduction, aided no doubt by the flat frequency responses and the low flutter. It would be nice to have mike/line mixing and some things different as indicated earlier, but the AD-6550 cassette deck as it is combines excellent performance with special features of its own.

Howard A. Roberson

Enter No. 94 on Reader Service Card

# CORELLI, CALINDA AND CANTATA

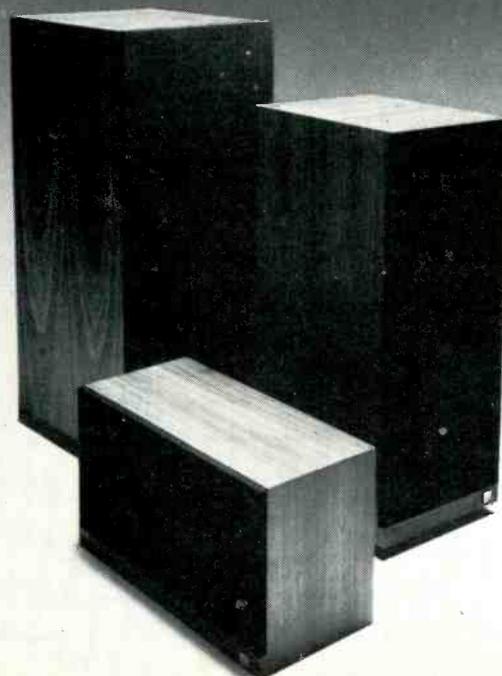
Each of these popular loudspeakers is an excellent example of the KEF total system design approach, whereby the drive units, the cabinets and the electronic circuits are developed together, using the computerised digital analysis techniques which KEF pioneered. The Corelli, designed for shelf mounting, offers remarkable bass performance and surprisingly high power handling from such a compact system. The Calinda and Cantata are tall, elegant floor-standing loudspeakers with a special arrangement of the drive units which give a truer frequency response, greater clarity and a sharper stereo image than any previous speakers of comparable size.

And because we make all our own drive units, we can offer a consistency in manufacture and performance which is unrivalled in the Hi-Fi industry.

Write for literature and the name of your nearest dealer.

KEF Electronics Ltd., US Distributors Intratec,  
PO Box 17414, Dulles International Airport,  
Washington DC 20041.

**KEF**  
The Speaker Engineers

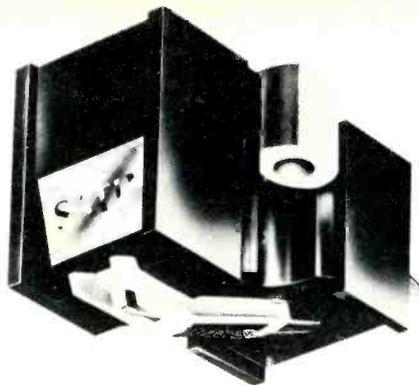


Enter No. 31 on Reader Service Card

## Satin M-18BX Moving-Coil Phono Cartridge

### MANUFACTURER'S SPECIFICATIONS

**Type:** Moving coil.  
**Stylus:** Diamond, 0.1 x 2.5 mils (Shibata).  
**Cantilever:** Beryllium.  
**Tracking Force:** 0.5 - 1.5 grams.  
**Output Level:** 1.2 mV  $\pm$  2 dB at 1 kHz (5 cm/sec rms 45°).  
**Frequency Range:** 10 Hz - 40 kHz.



**Crosstalk at 1 kHz:** 30 dB.  
**Impedance:** 16 ohms.  
**Load Impedance:** 30 to infinite ohms.  
**Compliance:** 20 x 10<sup>-6</sup> cm/dyne.  
**Weight:** 9.5 grams.  
**Replacement Stylus:** 18-NBX.  
**Price:** \$350.00.  
**U.S. Distributor:** Osawa & Co. (U.S.A.), Inc., 521 Fifth Ave., New York, N.Y. 10017.

Satin Co., Ltd., of Kyoto, Japan, introduced the first moving-coil cartridge that did not require a pre-preamp or a transformer, but instead could be inserted directly into the phono input jacks of most preamps. The Satin cartridge is a true moving-coil cartridge without the use of rubber or iron in its construction. Only the coil oscillates in the magnetic field. The cantilever pivot is fixed at one point (similar to that in a cutting head), and the cantilever does not rotate around its axis.

The amount of voltage produced by a moving-coil cartridge is wholly dependent on the size of the coil, the strength of the magnet, and the travel distance of the coil in the magnetic field. The Satin M-18BX has an aluminum ribbon coil (pancake form) made from an extremely thin aluminum ribbon which permits more turns of aluminum wire in a limited space. This also brings the weight of the coil to a relatively low level. This very light coil moves in a 250-micron gap in which the anisotropic Alnico 9 magnetic structure concentrates a magnetic flux density of 15,000 Gauss (average magnetic flux density in a moving-coil cartridge is about 2000 Gauss). The amount of coil movement is controlled by an electro-dynamic damping system.

The current Satin M-18BX cartridge has been improved over the version originally available. The improvement consists of a continuous outer ring-loop of beryllium-copper alloy surrounding the aluminum ribbon coil, which loop is grounded so as to act as a shorted turn to increase damping of the high frequencies, thus reducing the brightness. This feature is known as electromagnetic damping.

It is a rare moving-coil cartridge where the user can replace the stylus assembly without returning the cartridge to the factory for this work. The Satin M-18BX stylus assembly is held in place by a magnetic force, thus permitting easy replacement of the stylus assembly by the user.

This cartridge is designed to work into a load impedance ranging from 30 ohms to infinity. This low impedance is advantageous because it permits the use of longer phono cables and cable capacitance is less critical.

The body of the Satin M-18BX is physically large and cannot be mounted in a universal cartridge shell, such as the Audio-Technica Model AT-N, because there is no room to move the cartridge forward when adjusting the cartridge for correct overhang. However, the cartridge mounts easily in

the Technics cartridge shell whose front lip is about 3.5 to 4 mm high.

The cartridge pins are smaller than usual, thus it is necessary to either pinch the existing shell jacks to a smaller opening or replace the four wires with those supplied with the cartridge. Otherwise, the original shell wire jacks will be too loose for effective contact.

It is advisable, because of the heavy magnetic flux, to use turntables whose platter is made of nonferrous metal, otherwise the ferrous platter will pull down on the cartridge, resulting in a greater and uncontrolled tracking force.

As is our practice, measurements are made on both channels, but only the left channel is reported. During the test period, the average temperature was 74° F  $\pm$  1° (23.3°C) and the relative humidity 71 per cent  $\pm$  3 per cent.

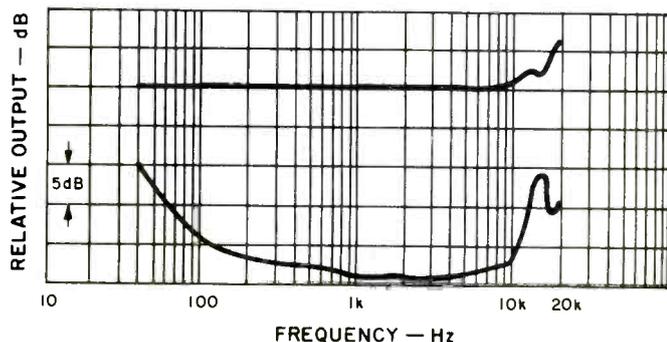
Frequency response, using the Columbia STR-100 test record and our reference tone arm, an Audio-Technica AT-1009, mounted on a Technics SP-10 turntable, is flat within 1 dB from 40 Hz to 7 kHz, rising slowly to +7 dB at 20 kHz. This peak is probably due to the tip mass resonating with the compliance of the test-record vinyl. Checking the 20 to 40 kHz response, we noted that there was sufficient rise at 30 kHz to work efficiently with a CD-4 demodulator for CD-4 record playing. Since CD-4 is in a quiescent state, we did not investigate this aspect of the cartridge. Separation over the audio range was quite good, being 24.25 dB at 1 kHz, 23 dB at 10 kHz, 15 dB at 15 kHz, and 20.5 dB at 20 kHz. The optimum tracking force for the cartridge we tested was 1.4 grams and the optimum anti-skating force was 2.25 grams. Because of its low impedance, capacitance appeared to have no noticeable effect. Square waves show a very fast rise time and a single cycle of substantial overshoot that quickly dies out, leaving a reasonably good square wave. The square wave indicates that there is a high frequency resonance of about 30 kHz.

There are a number of preamplifiers available today that do not have enough phono input sensitivity to be able to accept the rather low voltage (0.78 mV or 780  $\mu$ V) from the Satin M-18BX. In such instances, we recommend the use of the Verion Type-S step-up transformer to supply the necessary voltage for the phono input stage. We have tested this combination and find it to be superb, with no apparent loss of sound quality. We have found the Verion transformer to be one of the best cartridge transformers available today.

The following test records were used in making the reported measurements: Micro-Acoustics TT-2002; Shure TTR-103, TTR-109, TTR-110, TTR-115; Columbia STR-100, STR-112, STR-120, SQT-1100, JVC TRS-1005, TRS-1007; Deutsches HiFi No. 2; Nippon Columbia Audio Technical Records (PCM) XL-7004-6.

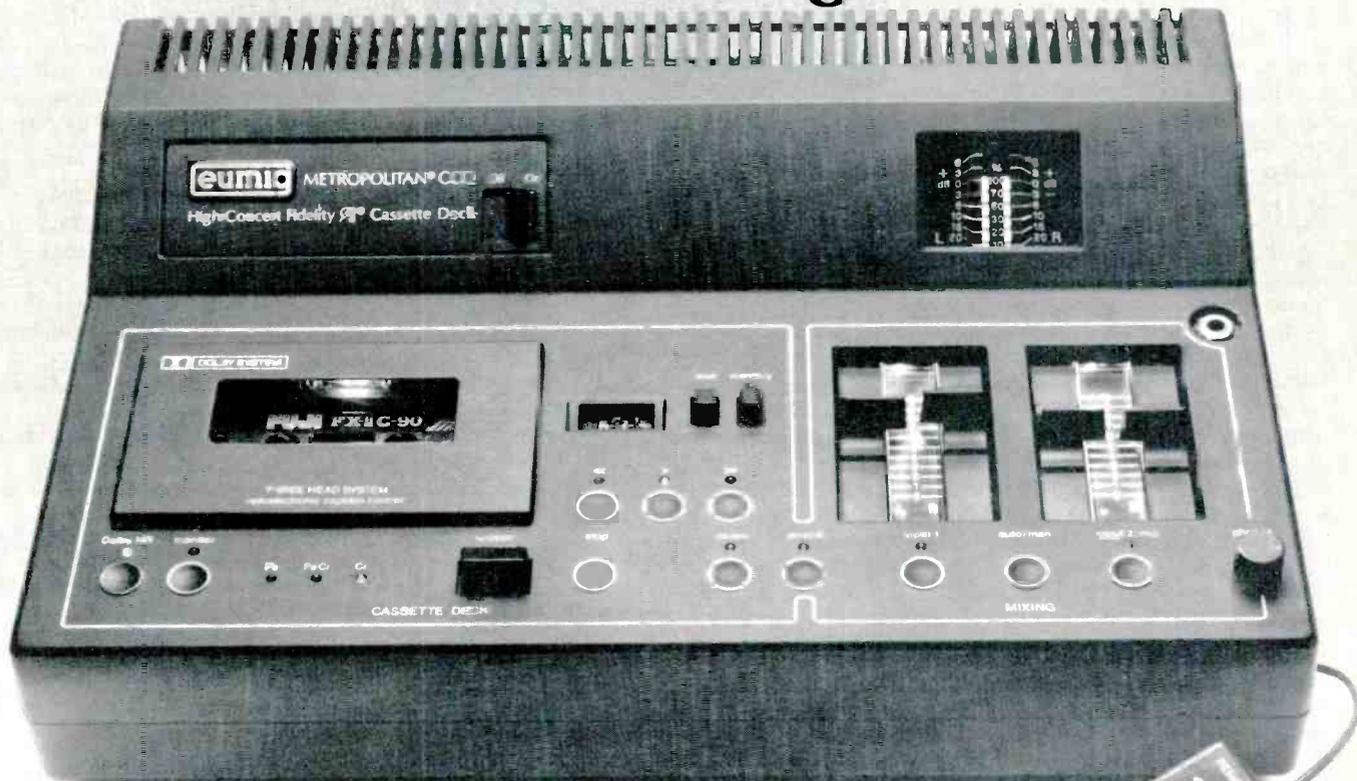
Wt. 9.39 g; d.c. res. 14.75 ohms; ind. 9.3  $\mu$ H; opt. tracking force 1.4 g; opt. anti-skating force 2.25 g; output 0.22 mV/cm/sec; IM dist. (4:1) + 9 dB lateral, 200/4000 1.1 per cent, +6 dB vertical, 200/4000 3.2 per cent; crosstalk (using Shure TTR-109) -30 dB; ch. bal. 0.5 dB; trackability: high freq. (10.8 kHz pulsed) 30 cm/sec, mid-freq. (1000 + 1500 Hz lateral cut) 25 cm/sec, low freq. (400+4000 Hz lateral cut) 24 cm/sec;

Fig. 1 — Frequency response and separation.



# The Eumig CCD.

## Opto-electronically engineered for absolute recording excellence.



Eumig, one of the world's leaders in electro-mechanical research and development, has introduced a revolutionary new technology to cassette recording. It's the OPTO-ELECTRONIC SERVO CAPSTAN DRIVE SYSTEM incorporated in the unique Eumig CCD. This technology offers so many advantages that the Eumig CCD will out-perform every other cassette transport.

### Ultra-Precision: The unique Eumig photo disc

Other decks use old-fashioned belts and flywheels to control the capstan. In the Eumig design these are replaced by a lightweight disc, photo-etched with 2500 radii, spaced precisely 1/50mm apart. When rotated, these radii create 15,000 pulses per second for instantaneous optically-sensed speed corrections. Wow and flutter is a mere 0.05% WRMS, and speed accuracy is  $\pm 1\%$ .



The Eumig photo disc weighs about 1/70th as much as a typical flywheel. When combined with an almost inertia-free, coreless drive motor, the CCD offers a startup time of less than 0.04 seconds, which means you never hear the wowing sound after a pause in recording. And the CCD boasts the fastest rewind time in the world—an astonishingly low 40 sec. (C-60).

### Rugged reliability

The Opto-Electronic Servo System is only one among many dramatic advantages of the Eumig CCD. It offers three precision heads of our own design, mounted in a die-cast aluminum carrier made at our own facilities (as are virtually all parts of the CCD), for greatest precision. The Eumig CCD is engineered

with circuit boards rather than wires, for utmost reliability.

### Advanced technology features

The comprehensive features of the CCD reflect Eumig's innovative technological approach. Two parallel LED displays allow simultaneous monitoring of both channel levels. Full solenoid/MOS logic is operated by feather-touch controls with logic-programmed LED indicators, and the flexible two-input mixing facilities use strictly DC controlled circuitry.

### Perfect recording every time

Perfect performance is guaranteed with every type of tape because the Eumig CCD offers virtually flat frequency response to 20,000Hz (chrome); Dolby calibration adjustment for different tape sensitivities; and an azimuth adjustment to optimize high frequency performance with each and every tape.

The Eumig CCD, probably the finest deck in the world, is now available for \$1300, including full-function remote control, at select audio outlets throughout the country. Write to us for the name of the dealer nearest you. Then listen and compare. We believe you'll agree—it's incomparable.

Eumig (USA) Inc., Lake Success Business Park, 225 Community Drive,  
Great Neck, New York 11020, (516) 466-6533

Enter No. 22 on Reader Service Card

Deutsches HiFi No. 2 300-Hz test bands tracked to 86 microns (0.0086 cm) lateral at 16.20 cm/sec at +9.66 dB level and 55.4 microns (0.00554 cm) vertical at 10 cm/sec at +5.86 dB level. Arm-cartridge resonance +4.25 dB at 6.8 Hz.

The Micro-Acoustics TT-2002 test record was used to check for tracking and transient ability. The Satin M-18BX cartridge had no difficulty in playing all tracking ability bands, including one with the highest level a modern stereo cutter head can record. However, the sound of a small bell appeared to be a bit too bright. The stereo percussion levels check the cartridge for both vertical and lateral tracking ability. The computer-generated high, low, and high/low mixed frequencies presented no problem to this cartridge in terms of transient ability.

The Shure Audio Obstacle Course Era III was a challenge inasmuch as the musical bells were tracked only to level 4 (+10 dB), after that the definition was lost. The violin became strident after level 4. Both the sibilance and bass drum tests were passed at all levels without difficulty. With the newer Shure Era IV Obstacle Course, the Satin M-18BX cartridge sound became strident with some breakup apparent at level 5 (+12 dB) for the bells, flute, and harp and flute. The sound lost definition after level 3 (+8 dB) of the flute and bells, but passed the harp bands at level 5. These results indicate that the Satin M-18BX cartridge is able to track just about any record and that it has a good transient response.

### Listening Tests

108

Our listening tests are performed both prior to actual laboratory tests and after all tests have been completed. When we first listened to the Satin M-18BX cartridge, we were amazed at the transparency that caressed our ears — truly unexpected. This was one of the most transparent sounds we have ever heard. Sonic clarity was excellent, as was the bass response. Even on extended listening, the cartridge still did not appear to impart sound or coloration of its own to the music.

The cartridge has a rising high end, as seen in the frequency response curve, and in view of this, we would caution users about combining the cartridge with speakers having an extended or rising high frequency response. However, we did not experience too bright a sound in our listening tests.

Records that are moderately to highly warped may be difficult to play since the cartridge has a very small clearance between the record and the cartridge body and, of course, cyclic rubbing of the cartridge and record can be quite annoying.

Cueing this and many other cartridges is difficult because the stylus tip is not readily visible. The record listening public would be ever grateful to the cartridge manufacturers if they would all mold an easily visible vertical center line on the front of the cartridge as well as on the head shell front. This line would assist in centering the cartridge on the shell and, most importantly, would be helpful in placing the non-visible stylus in the correct groove or band space when playing a record beyond band one.

The equipment used for the listening evaluation included a Technics SP-10 turntable with the Audio-Technica AT-1009 tonearm, Technics SP-10, Mark II turntable with its EPA-100 tonearm, Crown IC-150A preamplifier, a pair of Crown DC-300A amplifiers, each used in the monophonic mode, a pair of stacked Duntech DL-15B speakers for each channel, and a Columbia SQL-400A SQ decoder. A Platter Pad was used on one turntable, and the speakers were connected to the amplifiers with Polk Audio high definition, low distortion speak-

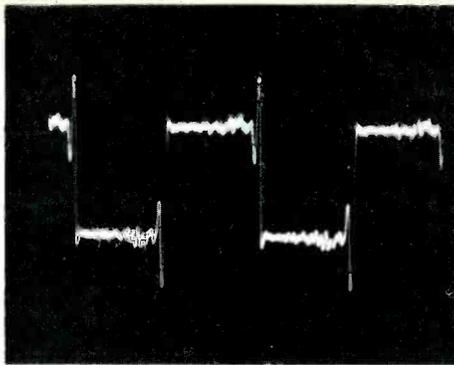


Fig. 2 — Response to 1-kHz square wave.

er cables terminated with an RC network.

A rigorous listening evaluation was conducted utilizing the specific records listed below as well as some of the records listed in previous reports. The records in themselves are excellent and were chosen to evaluate the capabilities of the Satin M-18BX cartridge to reproduce all manner of recorded sound as well as high levels without adding anything of its own to the music.

### Stereo

Walter Carlos: *Switched On Bach* — Columbia MS-7194.

Pavarotti: *Hits from Lincoln Center* — London OS-27577.

Elgar: *Violin Concerto*, Chung, London Philharmonic Orchestra, Soli — London CS-7064.

Brahms: *Symphony No. 3 in F. Major, Variations on a Theme of Haydn*, The Cleveland Orchestra, Maazel — London CS-7095.

Liszt: *Les Preludes; Prometheus; Festklänge, Vol. 2*, London Philharmonic Orchestra, Solti — London CS-7084.

Stravinsky: *Oedipus Rex*, London Philharmonic Orchestra, Solti — London OSA-1168.

### Direct to Disc

Lee Ritenour: *Gentle Thoughts* — JVC Direct Disc V1DC-1-E.

Lee Ritenour: *Sugar Loaf Express* — JVC Direct Disc V1DC-2.

(Both the above are super direct-to-disc recordings that should be heard by all audiophiles. They are available at most major record stores as well as audio stores.)

Virgil Fox: *The Fox Touch, Vol. 2* — Crystal Clear CCS-7002.

The Third: *Take the A Train* — Toshiba LF-95001.

Vivaldi: *Vivaldi Tricentennial* — Sonic Arts Laboratory Series No. 8.

Mozart: *The Joy of Mozart* — Sonic Arts Laboratory Series No. 9. (The above three discs are distributed by Audio-Technica.)

### Quadraphonic — SQ

Chicago: *Chicago VIII* — Columbia PCQ-33100.

Earth, Wind & Fire: *Spirit* — PCQ-34241.

Anthony Newman: *Organ Orgy* — Columbia MQ-33268.

### Pulse Code Modulation

Le Gallard: *Les Clavecinistes Francais* — Denon OG-7003-ND.

*Invitation to the Pop Classical Music, Vols. 1 & 2* — Denon SX-7004/5.

### Digital to Analog

Holst: *Suites Nos. 1 & 2; Handel: Royal Fireworks Music; Bach: Fantasia in G*, The Cleveland Symphonic Wings, Fennell — Telarc Digital 5038. (Although this is not the first digitally recorded symphony, this disc, which is being distributed by Audio-Technica, is the first to be released commercially; Crystal Clear was the first commercial company to record a symphony digitally and used the Stockham/Soundstream system. This is a good digital-to-analog recording, with only a few nits to pick — a lack of some highs, the bass drum tuned too high at 36 Hz, and some coarseness to the sound. However, in general, there is some great sound on this disc and, in particular, the impact of the bass drum is very good.)

### Conclusion

Anyone desiring a moving-coil phono cartridge without the expense of a pre-preamp, head amp, or a step-up transformer (so long as their preamp has sufficient sensitivity), should seriously consider obtaining the Satin M-18BX for inclusion in their audio system.

B. V. Pisha

Enter No. 95 on Reader Service Card

# Optonica ST-3636 AM/FM Stereo Tuner



## MANUFACTURER'S SPECIFICATIONS

### FM Tuner Section

**IHF Sensitivity:** Mono, 1.6  $\mu$ V (9.3 dBf)

**Selectivity:** Wide, 35 dB; Narrow, 80 dB.

**Capture Ratio:** 2.0 dB.

**AM Suppression:** 50 dB.

**S/N Ratio:** Mono, 75 dB.

**Image Rejection:** 120 dB.

**I. f. Rejection:** 110 dB.

**THD:** Wide, Mono, 0.1 per cent; Stereo, 0.15 per cent at 1 kHz; Narrow,

Mono, 0.2 per cent; Stereo, 0.3 per cent at 1 kHz.

**Stereo Separation:** 45 dB at 1 kHz.

### AM Tuner Section

**Sensitivity:** 250  $\mu$ V/M, internal antenna.

**Image Rejection:** 60 dB.

**I. f. Rejection:** 60 dB.

**THD:** 0.7 per cent.

### General Specifications

**Audio Output Voltage:** FM, 0.65 V fixed, up to 1.2 variable; AM, 0.25 V fixed, up to 0.46 V variable.

**Dimensions:** 17.4 in. (44.2 cm) W x 5 $\frac{5}{8}$  in. (14.3 cm) H x 14.7 in. (37.3 cm) D.

**Weight:** 18 $\frac{3}{4}$  lbs. (8.5 kg).

**Price:** \$300.00.

109

Optonica's Model ST-3636 is one of the lowest priced tuners currently available that features selectable i.f. bandwidth in its FM section, not to mention incorporating an unusually fine AM section compared with what's generally available in high fidelity tuner and receiver components. As a basic design, the tuner comes very close to being an "ideal" product in its price category.

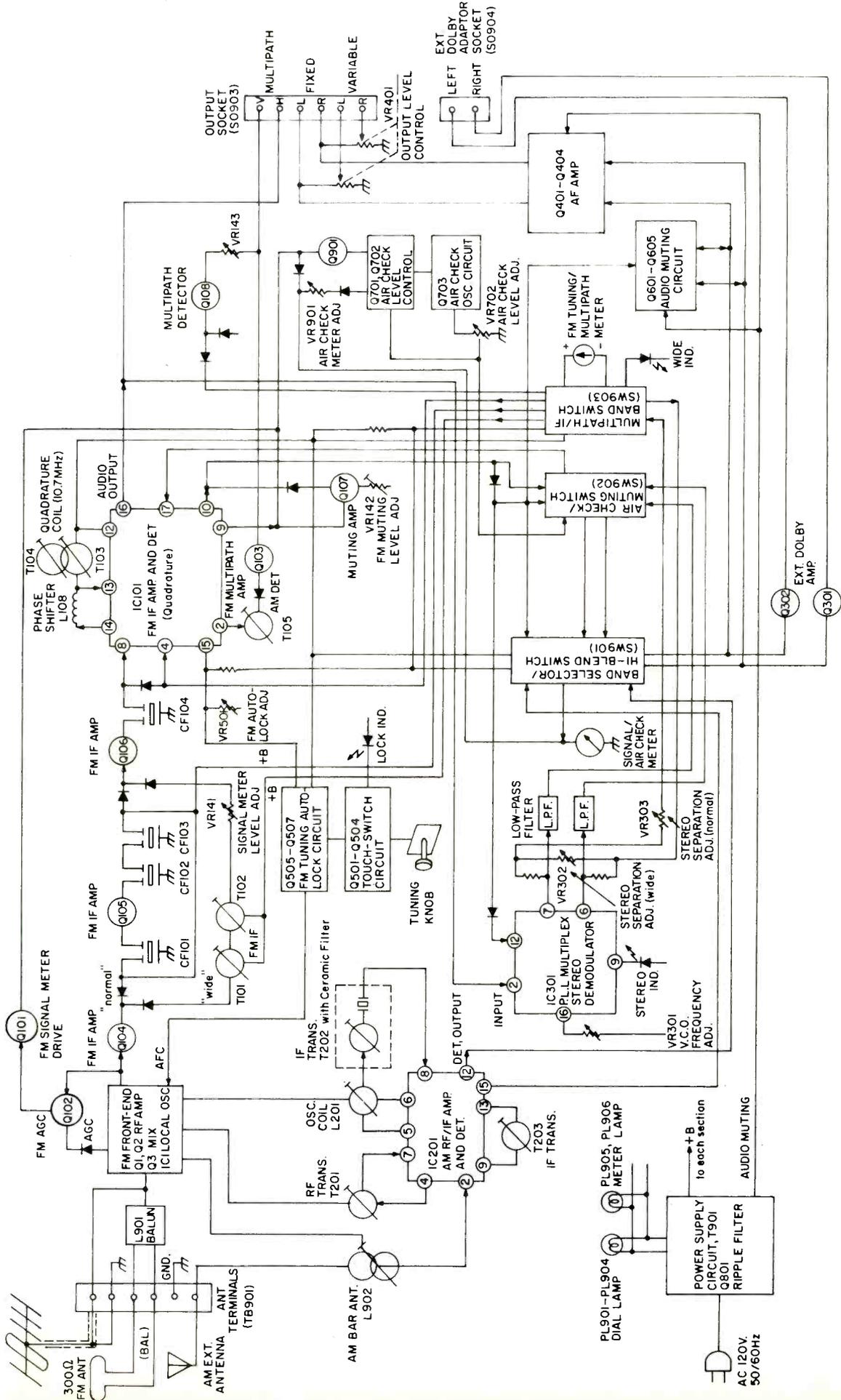
The simple, clean look of the front panel is suggestive of a high-quality component. Twin meters are separately framed and illuminated on the lower portion of the panel below the dial scale opening. Each meter serves a dual purpose... the signal-strength meter doubles as a modulation meter when

the built-in air-check test tone is activated, enabling the user to preset recording levels on an associated tape deck, while the center-of-channel meter doubles as a multipath indicator.

Controls to the left of the meters include a power switch and an output level control. A large flywheel-coupled tuning knob is to the right of the meters and two toggle switches are to the right of it. The first switch selects "normal" or wide-band operation of the i. f. section and also selects the "multipath" mode of the meter. When this setting is used, it is possible to monitor multipath audibly in addition to observing its minimization on the meter as the antenna is rotated.



Fig. 1—Block diagram of the Optonica ST-3636 tuner.



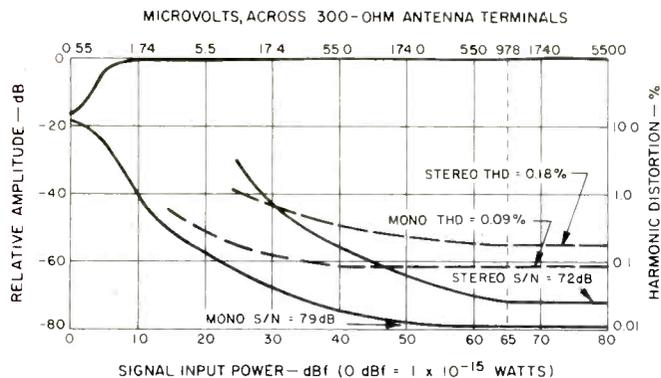


Fig. 2—Mono and stereo quieting and distortion characteristics in the FM section.

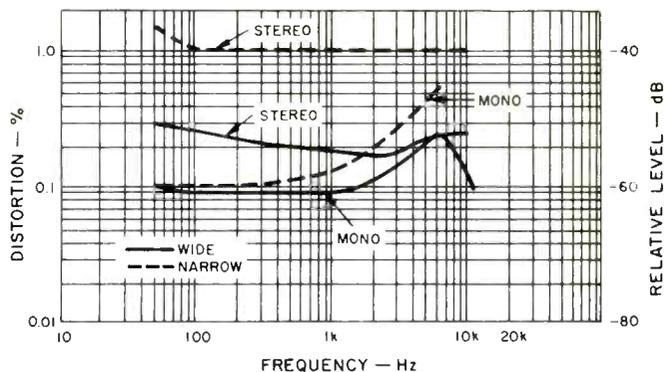
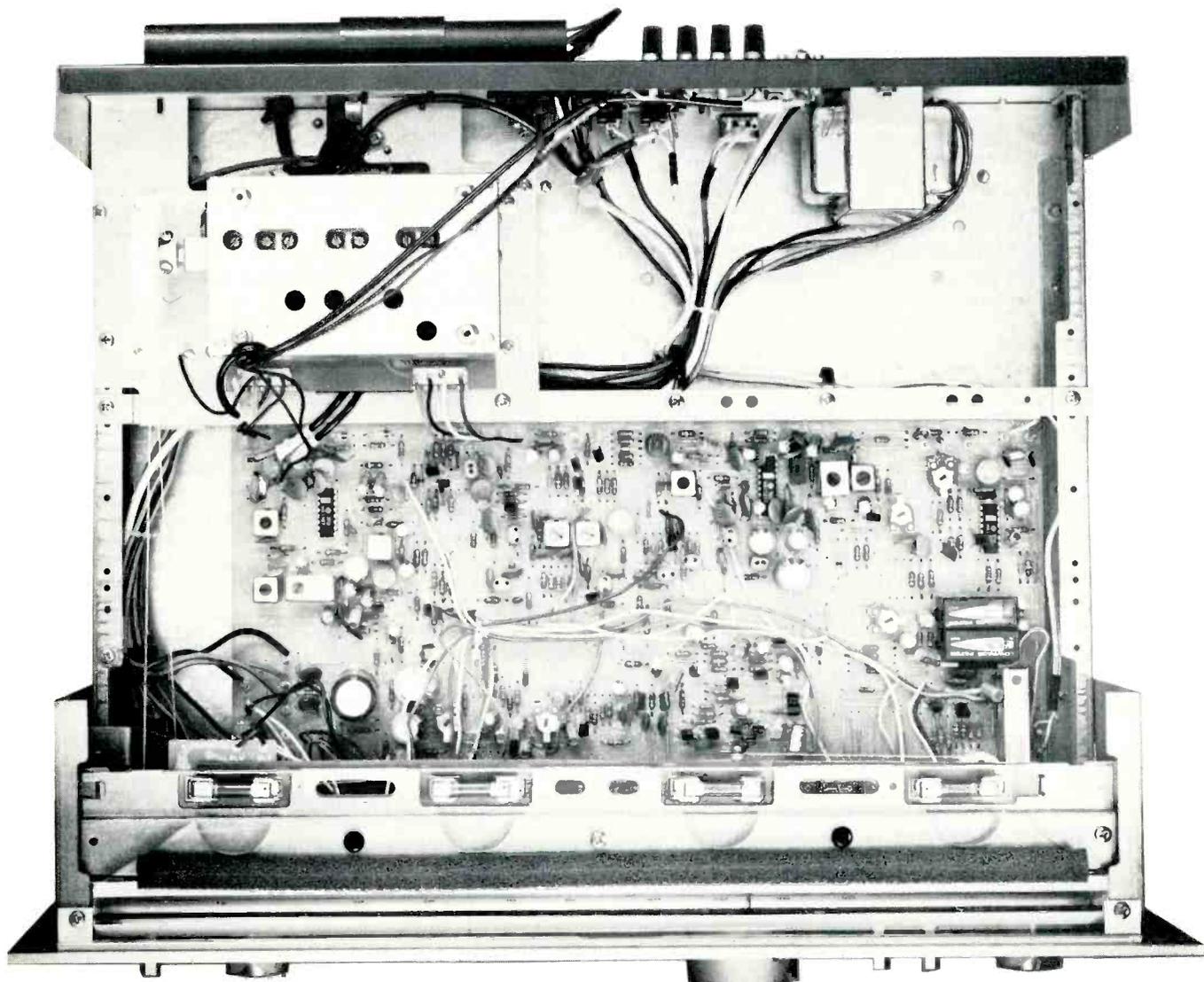


Fig. 3—Distortion vs. frequency.

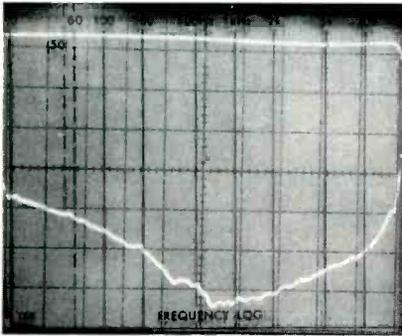
The second toggle switch turns muting *On* and *Off* and activates the internal air-check test tone. A selector switch at the extreme right has settings for *AM*, *FM*, *FM-high-blend*, and *FM mono*.

The dial area on the ST-3636 is fairly narrow and numbers are set behind the front dial "glass," requiring a shoulder- or head-height installation for easiest observation of the dial

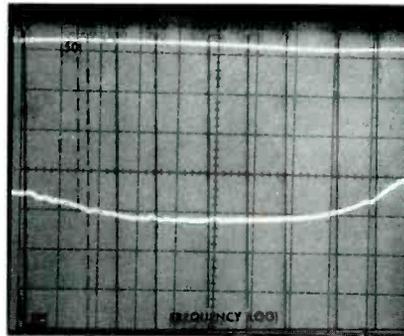
frequencies. The FM frequencies are linearly calibrated. The dial area also contains three indicator lights, one for stereo reception, one for denoting "wide band" i.f. mode (when it is selected), and one for "opto-lock" tuning, an AFC-like feature which is non-defeatable (except when holding onto the tuning knob).



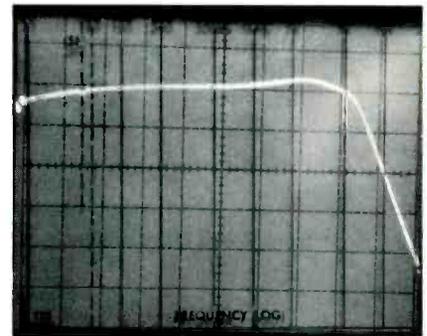
**Fig. 4—Frequency response and channel separation in the FM wide-band mode.**



**Fig. 5—Frequency response and channel separation in the FM narrow-band mode.**



**Fig. 6—AM frequency response.**



### Circuit Details

A block diagram of the ST-3636 circuitry is shown in Fig. 1. The front-end section consists of three dual-gate MOS-FETs and one integrated circuit used for the local oscillator. The i.f. amplification is accomplished by three transistors. In the wide i.f. position, double-tuned transformers are used with one ceramic filter to set i.f. bandwidth. In the narrow setting (normal), four ceramic filters are used to increase selectivity and narrow the pass band. Diode switches are turned *On* or *Off* by means of the front-panel, bandwidth-selector switch to determine which of the two signal paths will be followed.

The FM-detector circuit employs a quadrature detector IC, which also provides further amplification and limiting (IC-101 in Fig. 1). IC-301 is the multiplex decoder which includes a phase-lock-loop circuit. Outputs from the decoder are passed through a low-pass filter to eliminate or reduce sub-carrier products. Signals are then passed through buffer/amplifier stages, Q-401 and Q-403, prior to their application to the fixed and variable output terminals of the tuner.

### FM Performance Measurements

The graphs in Fig. 2 show quieting and distortion characteristics of the ST-3636 when operated in the "wide" mode. Signal to noise measured 79 dB in mono and 72 dB in stereo, while usable sensitivity was  $1.8 \mu\text{V}$  (10.3 dBf) in mono and  $7 \mu\text{V}$  (22.1 dBf) in stereo. The 50-dB quieting point was reached with input signal levels of  $2.7 \mu\text{V}$  (13.8 dBf) in mono and  $37 \mu\text{V}$  (36.6 dBf) in stereo. Distortion, for a 1-kHz test signal, was 0.09 per cent in mono and 0.18 per cent in stereo.

When we attempted to repeat these measurements in the "normal" or narrow setting we realized that this particular unit was somewhat misaligned. So long as we kept our fingers on the tuning knob, we were able to keep stereo THD down to around 0.18 per cent in the "narrow" mode. When we let go of the knob, THD increased to around the 1.0 per cent level. Obviously the "opto-lock" circuit was misaligned with respect to the quadrature detector in our particular sample, and unfortunately, there is no way to defeat this feature unless one holds onto the tuning knob. While we would have expected some increase in THD when using narrow band i.f. setting, this amount of increase was not caused simply by the restricted bandwidth, though we expect this difficulty is not basic to the tuner's design. This experience also serves to show that with a wide band i.f. system, slight detuning (caused by the "opto-lock" AFC circuitry) is not as serious as it is in the case of a narrow-band system. Figure 4 is a plot of frequency response and stereo separation in the "wide" mode and is excellent across the entire audio band of interest (more than 50 dB at 1 kHz). In the "normal"

bandwidth mode, separation decreased, as might be expected, and results are shown in Fig. 5. Under these test conditions, separation at 10 kHz measured 32 dB but again, by holding onto the tuning knob and retuning for optimum, we were able to increase this separation reading to 36 dB.

Stereo threshold was set at  $7 \mu\text{V}$  (22.1 dBf), while muting threshold was measured as  $9.0 \mu\text{V}$  (24.3 dBf). Selectivity, in the wide mode, measured 83 dB, while in the narrow mode it was exactly 35 dB as claimed. Capture ratio measured 1.0 dB in the wide mode, decreasing to 2.2 dB in the narrow mode. The i.f. and image rejection were both better than 100 dB. Overall frequency response from 30 Hz to 15 kHz was flat within  $\pm 0.5$  dB.

AM frequency response was exceptionally good on this tuner, particularly in this price class, and is indicated in the 'scope photo of Fig. 6. It was within  $\pm 2$  dB from 50 Hz to 6 kHz, most unusual for a high-fidelity AM/FM tuner. Listening tests to the AM section confirmed its superiority over other AM tuner sections recently tested.

### Use and Listening Tests

Our FM listening tests were confined to the wide-band mode. In that mode, reception quality was quite good, though the tuner's rather low AM suppression, made it mandatory that our antenna be properly oriented for minimum multipath interference. Once that is done, reception quality is indistinguishable from that of tuners costing considerably more than this one. In the owner's manual, we were advised to adjust the built-in air-check tone so that it indicated "60 per cent modulation" on the associated meter and to then adjust our connected tape deck for "OVU" indications on its meters. We found that with most programming this arrangement worked well and allowed us to make recordings from FM stations that nicely fit between the "noise floor" and "tape saturation" levels of our tape equipment. This is a handy feature that eliminates the usual scramble for the record level controls when one begins to record an FM program where levels almost always come as a surprise.

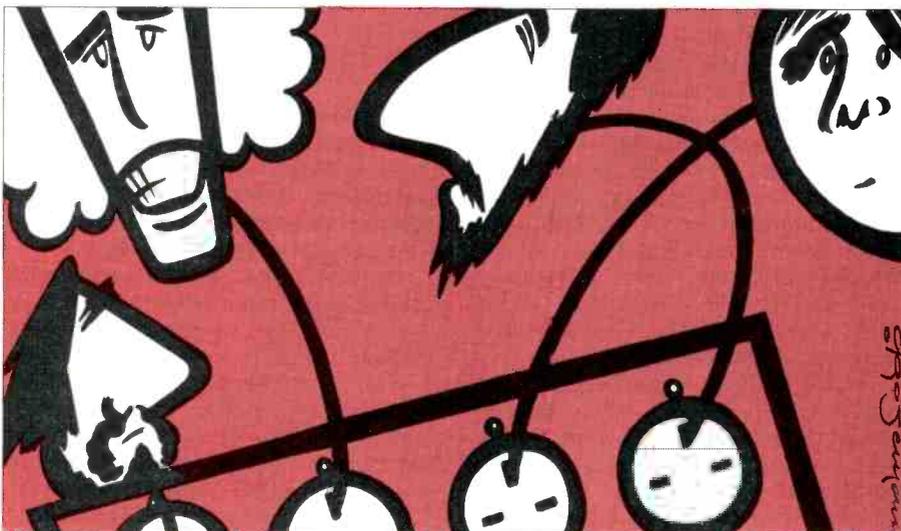
Properly set up, Optonica's "opto-lock" tuning circuitry does go a long way towards making tuning idiot proof, though the sample we tested was not able to deliver all of the excellent performance of which this tuner is capable. It is believed that our sample is the exception that proves we testers are not usually supplied specially selected sets, and we feel that quality control and alignment of all those other Optonica ST-3636s is better than what was applied to our test sample. It should further be pointed out that even with the misalignment, the unit was delivering very high levels of performance in many areas.

*Leonard Feldman*

Michael Tearson

Jon Tiven

# The Column



**Who Are You:** The Who  
MCA 3050, stereo, \$7.98.

The afternoon **Who Are You** arrived at the radio station I was filling in on the afternoon shift and they told me to do with the album as I saw fit, so I played it straight through. For about two weeks the advance single *Who Are You/Had Enough* had been monopolizing air time unmercifully, a dazzling, tantalizing sneak that kept expectations for the album rising like broken thermometers. Suffice to say, the album instantly fulfilled them.

With the passage of time it sounds no less monumental, even though it has been a turbulent month since the disc's release. Drummer Keith Moon, the living embodiment of the lunatic Who spirit, is dead. On the album's cover the chair he's sitting in says: "Not To Be Taken Away" on it. The four of them look so old and tired in the picture, and the loss of Moon seems so sudden and stupid. But, the album is still a mother . . . rock and roll of mythic proportions.

As usual Glyn Johns is coproducer, this time with engineer Jon Astley. They have lavished it with a classic Who sound, very reminiscent of **Who's Next** and **Quadrophenia**, but bigger. This is especially true following the flaccid **Who By Numbers**, for which **Who Are You** is a sweet vindication. The most obvious new element is Peter Townshend's growth on synthesizers, which wash over the album like waves, often to superb stereo effect. These effects work equally well

through speakers or headphones, creating a strong cinematic sense.

The album opens with *New Song* which sets the album's tone at the outset. In it Townshend writes "I write the same old song with a few new lines/And everybody wants to hear it," and this is true throughout the album.

**Who Are You** really breaks no uncharted ground, instead it's just a recycling and updating of The Who. The sound in the hands of its creators works just like it's supposed to. The material is strong and proud. Townshend knows just what he's doing in *New Song* and its mirror image *Music Must Change*. His *Sister Disco* relates how the standard Townshend hero, the kid with the big chip on his shoulder, gets into a fight and splits . . . a glorious song. But nothing tops *Who Are You*, the song is an anthem. Every time I hear it, I still get chills that very few songs can give me.

Bassist John Entwistle's contributions are no less impressive. *905* is a timely and witty piece about test tube babies. *Had Enough* is every bit the match for *Who Are You*, even angrier and more hostile — "I've had enough of being nice" — it ripples with strength. Clearly weak material, a plague on **Who By Numbers**, is no problem here.

Looking ahead, Peter Townshend has stated that The Who will go on with different drummers, that this is the way Keith would want it . . . but it can't and won't be the same. By circumstance alone, **Who Are You** is an

# McIntosh

## "A Technological Masterpiece . . ."



McIntosh C 32

### "More Than a Preamplifier"

McIntosh has received peerless acclaim from prominent product testing laboratories and outstanding international recognition! You can learn why the "more than a preamplifier" C 32 has been selected for these unique honors.

Send us your name and address and we'll send you the complete product reviews and data on all McIntosh products, copies of the international awards, and a North American FM directory. You will understand why McIntosh product research and development always has the appearance and technological look to the future.

Keep up to date.  
Send now - - -

McIntosh Laboratory Inc.  
Box 96 East Side Station  
Binghamton, NY 13904

Name \_\_\_\_\_

Address \_\_\_\_\_

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

If you are in a hurry for your catalog please send the coupon to McIntosh. For non-rush service send the Reader Service Card to the magazine.

Enter No. 35 on Reader Service Card

era's end. It is an album for the ages from one of the only two serious contenders for the title of "World's Greatest Rock and Roll Band." M.T.

Sound: B+ Performance: A+

**Cats On The Coast:** Sea Level  
**Capricorn CPN 0198**, stereo, \$7.98.

Sea Level, the core of which was made up of three members of the former Allman Brothers band, now stands independent of that past association. When the Allmans broke up in the Spring of '76, Sea Level formed with non-Allman Jimmy Nalls, on guitar and Allman, Jai Johnny Johanson on drums, Lamar Williams on bass and keyboardist Chuck Leavell giving the band its dominant musical direction. He has guided them away from Southern boogie towards jazz in a manner that has been exciting, rather than painful, for former fans.

Along the way, Sea Level has gathered a slew of new devotees and, in the past year, three new players — Randall Bramlett on keyboards, saxophone and vocals; Davis Causey on guitar, and George Weaver on drums (Jai Johanson, after 20 years on the road, has taken a leave of absence to spend more time with his family). Without breaking stride, the new members

have easily integrated their individual styles into the group's.

The unit is now complete and, it follows, so is their musical identity. Where the sound of the first album was a bit thin, **Cats On The Coast** has a richer sound, but like the last album, their music is fresh and filled with a vitality so real that it can almost be touched.

*Storm Warning* is Leavell at his best. The instrumental suite is a jazz-influenced boogie borne on a magnificent free-flowing melody. The other instrumentals on the album are nearly as impressive. The title cut and especially *Midnight Pass* allow the band room to stretch out. Randall's sax solos shine, and often Davis and Jimmy, who are recorded on separate channels, sound as if they are one exceptional player instead of two.

While Chuck writes most of the instrumentals, Randall and Davis carry off all but one of the remaining songs. The opening cut, *That's Your Secret* is a standout.

In an age when goods are manufactured in a slap-dash manner, it's refreshing to hear a group that understands the value of attention to detail. It shows both in their music and even the liner notes which are readable and easy to understand.

Stewart Levine's production is impeccable. There doesn't seem to be a sound not intended, and the clarity of the individual voices is exceptional.

The complexion and makeup of Sea Level have changed in the last year, but thankfully the level of musicianship and music has not.

Janet Melaragni

Sound B Performance: A+

**Don't Look Back:** Boston  
**Epic FE 35050**, stereo, \$7.98.

**Double Vision:** Foreigner  
**Atlantic SD 19999**, stereo, \$7.98.

**Caravan To Midnight:** Robin Trower  
**Chrysalis CHR 1189**, stereo, \$7.98.

Between these three records you've probably got more sales than on Bob Dylan's last ten albums put together — that's speaking conservatively. Boston and Foreigner pride themselves on shipping two million copies of each record the day of release, but unfortunately I must pronounce both of these albums D.O.A. (dead on arrival), passionless exercises of high amplification and adolescent trade-my-lust-for-yours lyrics. Although Foreigner is by far the better group and actually has composed two decent songs on their new meal ticket, neither one of these groups would be missed had they nev-

# When you appreciate the best.

## The Satin Moving Coil Cartridge by Osawa.

A small number of music lovers have tuned their hearing to such a degree that they can appreciate the fine differences a top-quality moving coil cartridge makes. For those fortunate few, nothing but a Satin will do.

"Light." "Airy." "Open." "Spacious." That's how Satin owners and product reviewers describe this masterpiece of the audio art. Here's why:

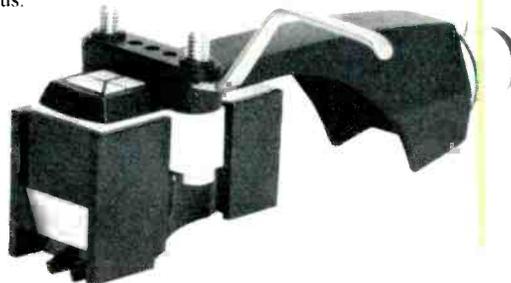
Superb stereo imaging is achieved by a single-point suspension. Extremely high output is ensured by Satin's flat 10 micron thick light-weight aluminum ribbon coil and a super high-energy magnet 1.8 times more powerful than conventional magnets.

In addition to its beautifully realistic sound, Satin has important advantages over other moving coil cartridges. The high output level, fully compatible with all pre-amps, integrated amps and receivers, eliminates the need for a noise-prone transformer or pre-preamplifier.

And since we feel that anyone who loves music enough to buy a Satin shouldn't have to suffer in silence when a stylus wears out, we've built the Satin line with user-replaceable styli. You don't have to send the cartridge back to the factory; simply replace the stylus yourself.

Your Osawa dealer has four Satin cartridges, priced from about \$175.00 to \$350.00. The prices may seem high, but once you've heard a Satin perform, you'll know it's worth the money.

To select the Satin cartridge that's ideal for you, ask your Satin dealer for a free copy of Osawa's "Consumer Guide to Phono Cartridges" or write directly to us.



**OSAWA**

OSAWA & CO. (USA) INC./521 Fifth Avenue  
New York, N.Y. 10017/(212) 687-5535-9/TELEX: 236593

er existed or merely been ignored by the public. Everything they have to contribute is merely an echo of Free, Led Zeppelin, Queen, The Yardbirds, and The Vanilla Fudge, and young musicians looking for someone to emulate certainly will find these two wanting of substance. Mr. Trower, on the other hand, is just beginning to get beyond his Hendrixian leanings and is actually playing in a mildly original style which combines Seventies technology and the feel of Memphis Soul Music.

But it's only fair to attack these records individually, so let's start with Boston, the sitting ducks. Their songs are almost universally awful, their stupidity undeniable as you survey their lyric sheet, and every guitar solo leader Tom Scholz plays should be footnoted (his steal for the single comes from Jimmy Page's *Happenings Ten Years Time Ago*). The new album sounds even more mechanized than the last, but I suppose that it's hard to keep one's humanity and humility when success comes too soon. As with their last album, most of these songs would seem to have been written years ago, and instead of aging gracefully, they all sound like vinegar, with the possible exception of Brad Delp's *Used To Bad News* which seems a cut above the rest of the tunes. After seeing the

band live, I can only add that if there is even a trace of artistry on their records, it is completely gone by the time the floodlights hit, where these studio "Wizards" seem like fish out of water, each racing through his bit as quickly as possible without concern for what anyone else is playing.

Next on the bill is Foreigner, who resemble a band (they have a drummer who can keep a beat, for starters) and are seasoned veterans of the rock circuit. Mick Jones bashed his brains against 10,000 seaters with Spooky Tooth, Lou Grammatico was part of a blatant Free imitation called Black Sheep that never got anywhere, and Ian MacDonald's stint with King Crimson didn't make him rich though he achieved a modicum of fame. Louis does a fair Paul Rodgers imitation, Mick combines an interesting rhythm style with fast-but-derivative licks, and drummer Dennis Elliott has some distinctive rhythms which seem to be more responsible for the Foreigner sound than anything else save the production. The title cut and *Hot Blooded* are exciting, which makes one almost ignore the fact that they're lifted, but the rest of the album seems flabby and uneven for an album well under 40 minutes in length (although Boston is even worse, giving their listeners just over 30 minutes for their seven-ninety-

eight). **Double Vision** isn't bad, but if I was in Louis Grammatico's shoes, I'd wonder why Foreigner is making millions when Black Sheep fell flat when the main difference is not a musical one.

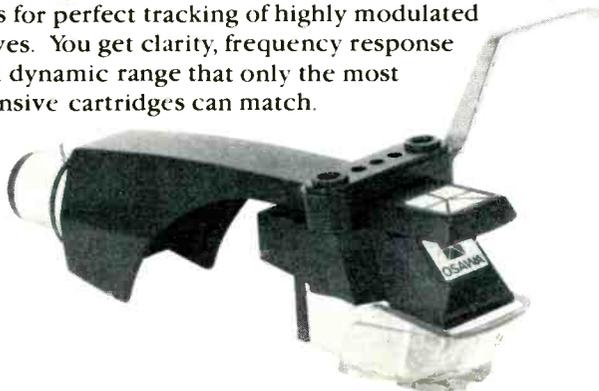
Robin Trower's been at this game a lot longer than any of the rest of these musicians, and as a veteran with a significant amount of success behind him, he can afford to take chances. He doesn't worry about his latest album selling quadruple platinum just to match his last album's success — he's found an audience that he can steadily rely upon to follow his career so he can do what he pleases. The funny thing is that the group he came from, Procol Harum, started as something close to a blue-eyed soul group (*Whiter Shade of Pale* and *Homburg* were very r&b) that turned to psychedelia and followed their more baroque leanings, whereas the reverse is true of Robin's career. He started as a three-piece group that was strictly Heavy Metal and has now produced an album that resembles Al Green singing with the Jimi Hendrix Experience. Now Robin is not the best guitar technician in the world but he plays with a certain amount of style and feeling, and his band manages to keep a solid groove while Mr. Trower and singer Jim Dewar wail away in their

# High technology lowers the price of high performance.

## Introducing the new MP cartridge by Osawa.

With innovative engineering, Osawa has made superior cartridge performance affordable.

In the new MP cartridges, Osawa uses Permalloy to modulate the magnetic field generated by a cobalt magnet. This unique, lightweight, high-output combination ensures high signal-to-noise ratio and a freely moving stylus for perfect tracking of highly modulated grooves. You get clarity, frequency response and a dynamic range that only the most expensive cartridges can match.



The cantilever is perfectly formed (and made of carbon fiber in our top 300MP model) for high strength, low mass and uniform frequency transmission. It's supported in a special "Butyl" synthetic rubber damper to provide just enough restraint to keep the tip in the groove. Butyl is virtually unaffected by temperature and humidity, so your music won't change with the seasons.

There are three new Osawa MP cartridges, priced from about \$35 to \$110. Each is available unmounted or conveniently pre-mounted in the unique Osawa Universal Head Shell. Visit your Osawa dealer for a complete demonstration. When you hear the MP perform, you won't believe the price.

Be sure to ask your dealer for a free copy of Osawa's "Consumer Guide to Phono Cartridges." Or write directly to us.

**OSAWA**

OSAWA & CO. (USA) INC./ 521 Fifth Avenue  
New York, N.Y. 10017/(212) 687-5535-9/TELEX: 236593

Enter No. 41 on Reader Service Card



**...the best...**

Many of you are familiar with BRYSTON as the best-sounding power amplifiers in the world. BRYSTON amplifiers have also acquired an enviable reputation for ruggedness and long-term reliability. All BRYSTON amplifiers undergo extremely rigorous quality control procedures, including 100% testing of power transistor safe operating area and leakage, with complete Beta-matching parameters, and a total operational checkout (including degree and kind of distortion) before and after each amplifier's 100-hour full power "burn-in" with a square-wave input signal and capacitive loading on the outputs.

Our no compromise, quality-conscious attitude ensures that BRYSTON amplifiers sound the best and stay the best. Write to us today and we'll tell you more.

Model 2B with 50 Watts, Model 3B with 100 Watts, Model 4B with 200 Watts

(All ratings per channel, both channels driven 20-20KHZ, 8Ohm @ THD & IMD less than .025%)

**BRYSTON MFG. LTD.**

57A WESTMORE DR., REXDALE, ONTARIO, CANADA M9V 3Y6 TELEPHONE: 746-1800, CABLE BRYREXCAN

# See What You've Been Missing... Read Audio's Classified

116



## Sonics

That, in the final analysis, is what counts.

While Apt can provide you with what is perhaps the most thorough technical explanation of any as to *why* the Holman Preamplifier actually sounds better in a high-fidelity system, what matters in the end is *how* it sounds.

The differences between preamps are not mysterious, and they are clearly audible. Apt seminars have demonstrated this to hundreds of people coast-to-coast. Interfacing problems account for most of the differences between otherwise fine equipment, and the Holman Preamp has been designed to be especially free from interaction.

Thus it sounds better in the wide range of conditions encountered in a high-fidelity music system.

If you would like more information about the Holman Preamplifier or the technical considerations underlying its design, please check the appropriate box(es) on the coupon and send to:

**Apt Corporation**  
Box 512 Cambridge, MA 02139.  
Thank you.

- For a brochure and the name of your local dealer.
  - For reprints of reviews.
  - For a set of 5 technical papers by Tom Holman, send \$2 (Canada \$3).
  - For an Owner's Manual, send \$4 (Canada \$5) refundable with purchase.
- Name \_\_\_\_\_  
Address \_\_\_\_\_

Enter No. 14 on Reader Service Card

plaintive tones. There are four or five interesting songs on **Caravan To Midnight**, and although they're in no great hurry, the band is headed in the right direction. I must add that for a streamlined Seventies band, they've taken a more esoteric and original approach to success. While Foreigner and Boston may reach more people, Trower will reach deeper, and any kind of a depth to a band of this nature in 1978 is not only a rarity, it is highly commendable.

J.T.

**Boston**

Sound: C Performance: D-

**Foreigner**

Sound: B Performance: B

**Trower**

Sound: B+ Performance: B+

**The Man Machine: Kraftwerk**

Capitol SW 11728, stereo, \$7.98.

I don't want to give you the wrong impression of **The Man Machine**, but there is an expression used with computers GIGO, four letters which stand for the phrase "Garbage in, garbage out." What this infers is that machines are only as good as the people who program them, and their capacity to deliver depends solely upon what they digest. Kraftwerk is using highly technical equipment to produce original sounds, and I have no quarrel with their methods. In fact, I admire the way that they orchestrate their tunes, using synthesizers in a manner so deceptively simple it mesmerizes the listener.

Unfortunately, the Hutter/Schneider/Bartos team hasn't much composing ability, and if any of these tunes were performed without the aid of the electronics, they would fall flatter than Ralf Hutter's singing. The instrumental parts of the album are quite pleasing to the ear, but yet again the group doesn't show much innovative flair when it comes to chord progressions. All they are about is *sound*.

Now this isn't to say that electronic music cannot be incorporated within pop music successfully, for Donna Summer and Brian Eno have both demonstrated that with the proper knack, there is some complementary relationship between transistor instruments and the transistor radio. I'm afraid Kraftwerk's strength lies in endless repetition, which can be edited down to a nice three-minute single but doesn't hold up on an elpee. J.T.

Sound: B+ Performance: C

**Not Shy:** Walter Egan

**Columbia JC 35677**, stereo, \$7.98.

Brash kid, Egan. He makes up these songs about teen thrills and chills, "Blonde in the Blue T-Bird" stuff. Coproducing the album with Fleetwood Mac's Lindsay Buckingham, he gets a brighter, spunkier version of the Mac sound, reinforced further by Stevie Nicks' harmonies on half the cuts. If Walter is not always surprising or a blazing original, still he is good light fun, especially as cruising music. Take him or his music too seriously, and they both fall apart. Take it light and it treats you right. M.T.

Sound: B

Performance: B

**Toby Beau:** Toby Beau

**RCA ALFI-2771**, stereo, \$7.98.

Toby Beau is made up of five singer-songwriter-musicians from the Rio Grande Valley who are, curiously enough, managed by the same company that handles comic strip rockers, Kiss. But, don't make any judgment from that fact.

Their debut album is a sparkling collection of tunes which run the gamut from chip-kicking, rollicking bluegrass tunes to cry-in-your-beer cowboy blues, all performed in a crisp, pure manner with clear vocal harmonies mixed with guitars that lash out driving, uncompromising rhythms. They combine this rhythmic sense with beautifully written lyrics, turned in by each member of the band, and come up with what seems a sure-fire recipe.

The actual recording of the album could have been cleaner. Fortunately the lucid, uncluttered production by Sean Delany overcomes some minor technical flaws, such as a bit too much surface noise.

**Toby Beau** works as an album. The variation and balance of songs flow, opening with a rocker, building through a frenetic pickin' tune, then mellowing to several lilting ballads. *Same Old Line* is particularly lovely, and *My Angel Baby* is a direct descendant of '50s rock'n'roll. Side two opens with a train song, evens off with *Buckeroo* (which really highlights the group's incredible harmonies), softens, gets lively again, and then closes with the most memorable tune on the album. *Broken Down Cowboy* opens with high, almost angelic, a capella harmonies which rivet the listener to his speakers.

It is a sincere pleasure to find a new musical outfit that's this talented. So all you Outlaws, Charlie Daniels, Eagles, and Firefall fans, be on the listen for Toby Beau. Janet Melaragni

Sound: C-

Performance: A

# Q • How close can hi-fi get to an authentic musical experience?

## A • Slip on new Audio-Technica Stereophones and hear for yourself.

If you want to find out how good the new Audio-Technica Stereophones really are, don't just compare them with other headphones. Put them up against the very finest *speaker* systems. But don't just listen to the equipment. Listen to the *music*. And be ready for a surprise!

Judged on the basis of flatness of response, freedom from distortion, transient response, sensitivity, and independence from room acoustics, these new dynamic and electret condenser models are perceptibly better sounding than speaker systems costing hundreds of dollars more.

And if you think that great performance can only come from heavy, bulky stereophones, get ready for another surprise. Our heaviest model is less than 7½ ozs. and our lightest is an incredible 4¾ ounces light. Comfort that lasts an entire opera if you wish.

For all the facts, send for our catalog. But for the revealing truth about stereophone performance, listen and compare at your nearby Audio-Technica showroom. It will be a great *musical* experience.



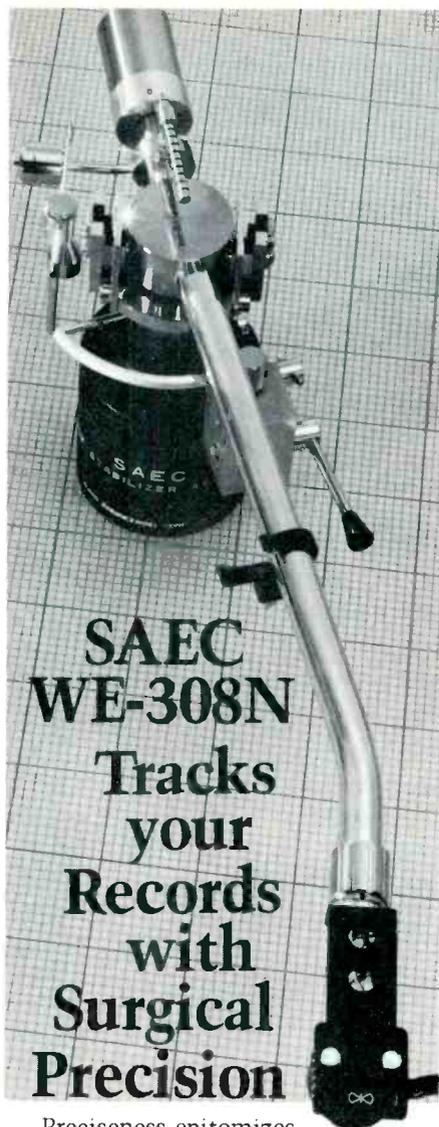
**Model ATH-7**  
Our finest Electret Condenser with LED peak level indicators  
\$149.95

**Model ATH-1**  
The moving coil dynamic stereo-  
phone that weighs just 4¾ oz.  
\$29.95



**audio-technica**  
INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 128A-1, 33 Shiawassee Avenue, Fairlawn, Ohio 44313  
Available in Canada from Superior Electronics, Inc.



**SAEC  
WE-308N**  
Tracks  
your  
Records  
with  
Surgical  
Precision

Preciseness epitomizes SAEC's WE-308N tonearm. It utilizes an advanced design, double knife edge bearing system, automatic tracking pressure compensation, inside force canceller, even an ultra-low resonance "ultimate" headshell.

What does all this do to your records? Virtually nothing. Nothing, that is, when it comes to record wear. But everything when it comes to allowing your cartridge to translate with unwavering accuracy the musical information locked between the grooves of your records.

Write for literature that reveals in detail all the exquisite features of SAEC's WE-308N tonearm, and SAEC's other fine audiophile products.

Distributed by:

**AudioSource**

1185 Chess Drive, Foster City, CA 94404  
Phone: (415) 574-7585

Enter No. 10 on Reader Service Card

# Jazz & blues



**Cumbia & Jazz Fusion:** Charles Mingus  
Atlantic SD 8801, stereo, \$7.98.

Charles Mingus, crippled by illness and confined to a wheelchair for the past year, recorded these remarkable sessions on March 10, 1977, at Atlantic Records in New York City, and on March 31st and April 1st, 1976, at Dimarphon Studios in Rome. Certainly this onslaught of physical afflictions did not impair the creativity and the riveting, often molten, intensity of Mingus' music.

Both the title piece on side one and the *Music for Todo Modo*, taking up all of side two, are film scores. "Cumbia & Jazz Fusion" is a movie dealing with the cocaine traffic between the U. S. and Columbia; the music features Mingus' recent band augmented by horns and Latin percussion. The score is 27-minutes long and begins with a chorus of bird calls and jungle sounds, then introduces a series of folkish themes derived from native rhythms of the Cumbia Indians of Columbia. A propulsive vamp gives the performance a driving exuberance as Mingus lays down a pulsing bass *ostinato* shaded by Gary Anderson's contrabass clarinet. The Indian themes are tossed around by the oboe and bassoon, while the ensemble textures grow in intensity, then the themes are run through Latin, bop, blues, ballad, and brassy Ellingtonian-growl variations. This shifting kaleidoscope of sound gives way, every so often, to several incisive solos — crisply reflective piano statements by Bob Neloms and agitated tenor breaks by Ricky Ford; there is

even a brief vocal passage by Mingus and drummer Danny Richmond debunking *Shortnin' Bread*. All of these seemingly disparate elements are brilliantly welded into the whole. This is indeed a major musical statement from the bassist-composer, one that ranks with *Pithecanthropus erectus*, recorded in 1956.

*Todo Modo* on the second side is, by way of contrast, somber and reflective. Now in his middle years, Mingus appears to have moved away from much of the anger and tension of his youthful recordings. This is an intriguing, haunting piece of unusual power. It opens with unaccompanied jazz horns and moves into richly voiced ensembles evoking images of cathedrals — Mingus here makes brilliant use of the brass voicings of Italian liturgical music. The "Todo Modo" film deals with a series of murders, and also explores the murky, mordant relationships between church and state in Italy — not exactly a subject to intrigue the American film audience with its *kitschy* tastes and shallow interests — I have doubts as to whether it will ever be shown here. However, the Mingus score transcends the film proving again that Mingus can successfully incorporate diverse musical elements into an intriguing palate of sound. These two performances make this an important and classical jazz recording. The sonics from both sessions are crisp, clean, and bright.

John Lissner

Sound: B+

Performance: A+

**Footwork:** John Hammond  
**Vanguard VSD-79400**, stereo, \$7.98.

Bluesman John Hammond's latest release is a strong dose of the compelling solo acoustic guitar performances that have long enthralled his club audiences. Drawing on a wide repertoire of blues and related material, Hammond's emotional interpretations of classics by such seminal country blues figures as Robert Johnson display unquestionable conviction and an often riveting intensity. As an added treat, there's two duets with veteran barrelhouse pianist Roosevelt Sykes that successfully recreate the refined texture of the early urban blues.

One of Hammond's greatest interpretative strengths as a solo guitarist is his skill at capturing the essence of songs typically associated with full band performances. On this set he tackles Bo Diddley's *Who Do You Love*, substituting an insistent, muscular rhythm pattern for the telltale Bo Diddley beat, but retaining the key guitar licks which have always gone hand in hand with the song. *Go No Further*, a Little Walter Jacobs number, receives a similarly spirited guitar and rack harp treatment, featuring the stop-time arrangement that marked the first cutting of this tune. Neither track suffers for want of sidemen; Hammond's cohesive interpretations leave no holes which need to be filled. It's the presence of well-crafted reworking of Chicago tunes alongside of 12-string guitar versions of such moving rural chestnuts as Blind Willie McTell's *Broke Down Engine* that make listening to this album such a pleasure.

If you're a blues purist who's always found Hammond's vocals a touch affected, then you'll be relieved to know that they take a back seat to his relentlessly driving slide guitar work and snarling, moaning harp. The album's only weak spot is Mose Allison's *Everybody Cryin' Mercy* where the lyrics seem contrived and didactic next to the homespun wisdom of the giants of the rural blues. **Footwork** should please both Hammond's fans and all lovers of acoustic blues guitar.

Roy Greenberg

Sound: B Performance: A

**The Grip:** Arthur Blythe  
**Indiana Navigation IN1029**, stereo, \$7.98.

**The Grip** is one of the few definitive contemporary jazz releases to come out in the last 12 months. It ties together many of the concerns which the *avant-garde* has been experimenting with in a tight, concise, and exciting package. Arthur Blythe has chan-

AUDIO • December 1978

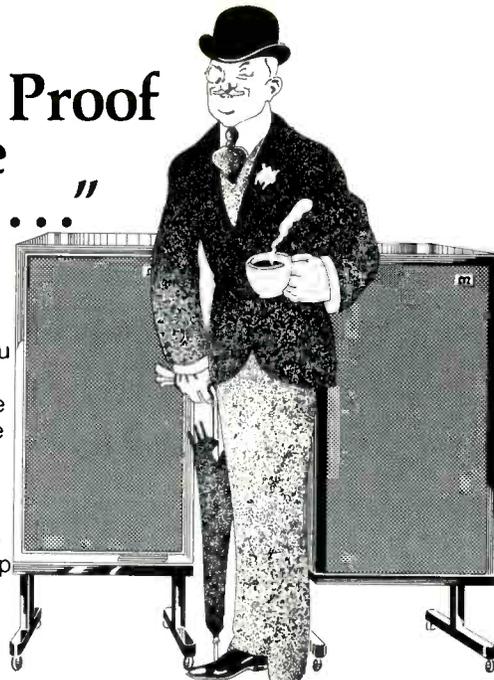
## "The Proof is in the Listening ..."

Most speaker companies romance you with stories about how their speakers are made and why they sound the way they do.

If you're into the "quality story," we can tell that story very well. If it's handcraftsmanship that turns you on, our speakers are almost entirely built by hand and tested by ear.

But when you come right down to it... the proof is in the listening. That's why we, at Monitor, want you to listen to our speakers.

Monitor Audio... Quality audio components... from Britain with care.



**Monitor Audio Ltd.**

Canadian Distributor:  
 Edon Acoustics Limited, Ottawa, Ontario.

Distributed by  
**AudioSource**  
 1185 Chess Drive, Foster City,  
 Calif. 94404

Enter No. 6 on Reader Service Card

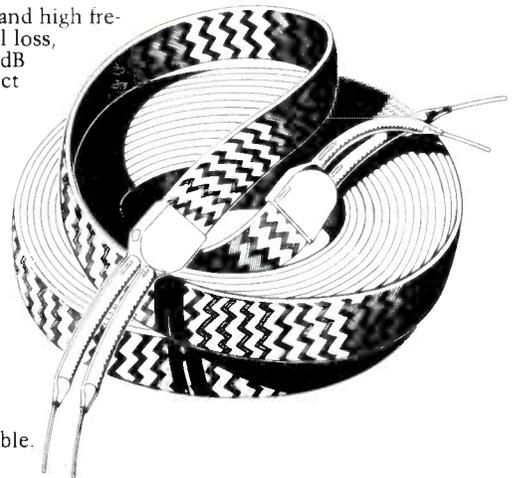
119

## Gain From A Piece Of Wire

Expect greatly improved mid and high frequency response, minimal signal loss, lowered distortion and up to a 2dB gain in volume when you connect AudioSource Ultra-High Definition speaker cables to your system.

That's because UHD cable is more than just a piece of wire. It's actually 120 pieces of wire per cable (60 per lead). Each composed of high purity copper, individually enameled, heat-set and braided into two flat strands aligned at 90° angles to one another. All wrapped in vinyl and as easy to connect to your system as it is to install under carpeting or along walls.

AudioSource UHD speaker cable. Gain from it!



**AudioSource**

1185 Chess Drive, Foster City, CA 94404  
 Phone: (415) 574-7585

Please send \_\_\_\_\_ pairs of UHD-5 (16.4') Speaker Cables at \$32.50 per pair. Total \_\_\_\_\_  
 Please send \_\_\_\_\_ pairs of UHD-10 (32.8') Speaker Cables at \$65.00 per pair. \_\_\_\_\_  
 Add postage and handling of \$1.50 (each). \$1.50  
 (California Residents add 6% sales tax.) \_\_\_\_\_  
**TOTAL** \_\_\_\_\_

I enclose check \_\_\_\_\_ or money order \_\_\_\_\_  
 Charge my BankAmericard/Visa \_\_\_\_\_ Master Charge \_\_\_\_\_  
 Account No. \_\_\_\_\_ Expires \_\_\_\_\_  
 Signed \_\_\_\_\_  
 Mail Speaker Cables to:  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

UHD cables are available at finer audio stores or mail this coupon and your remittance to AudioSource, 1185 Chess Drive, Foster City, Calif. 94404. Orders received will be processed immediately; however, please allow three to four weeks for delivery.

Enter No. 8 on Reader Service Card

Your Presence is Requested  
at the exciting performance debut of

the Premier Line

Moving coil Cartridge System

Now playing

at your Sumiko quality-audio dealer's showroom.

Another exceptional product of **sumiko**  
Box 5046 Berkeley Ca 94705

Enter No. 62 on Reader Service Card

## Coming in January "Special Antenna Techniques"

# The Connoisseur



Available With & Without Tone Arm.

## Only For The Chosen Few

The Handmade Connoisseur Turntable only for the chosen few.  
Because no one can mass produce perfection.

Six new lines to choose from.  
For the name of the dealer nearest you, write:

Exclusive U.S. Agent  
14225 Ventura Blvd. **Heravic** Sherman Oaks, CA 91423  
ELLI THONKS, INC. (213) 990-2777.

- SIGNAL TO NOISE —70 dB WHEN MEASURED IN ACCORDANCE WITH DIN 45539;
- BETTER THAN —90 dB HUM LEVEL;
- BETTER THAN 0.055% WOW AND FLUTTER.

Enter No. 26 on Reader Service Card

neled all the feelings and moods that have existed throughout the history of jazz into **The Grip**. The instrumentation of the band itself comes from all eras of the music. Bob Stewart's tuba is from the formative years in New Orleans. Muhamad Abdullah plays percussion which reaches even further back into the music's roots. At the other extreme is the cello, played by Abdul Wadud, which entails the more recent European influence on jazz. Holding it all together are the mainstays of the music—Ahmed Abdullah on trumpet, Steve Reid on drums, and Arthur Blythe on alto.

The emotional flow through time goes deeper than instruments, though. *Spirits in the Field* is a wailing dirge that travels from the funeral marches of Sidney Bechet to the mournful screams of Albert Ayler. The interplay on the title track is as coherent as a Chicago jam, but with much more spontaneity and intuitiveness. *Lower Nile* reaches the exoticism of African tribalism in a driving sax and percussion dance.

Arthur Blythe has honed a clear statement of where the *avant-garde* stands at the moment. His own horn playing is full and nimble amidst the pulsing weave of his sidemen. **The Grip** captures this tight band in a very live sounding concert.

Write to India Navigation P.O. Box 559, Nyack, NY 10960 *John Diliberto*

Sound: B

Performance: A -

### The Pablo All Stars Jam

**Pablo 2308-210**, stereo, \$6.98.

There are rollicking moments here — notably those supplied by Clark Terry's rich, perky flugelhorn, Oscar Peterson's sprightly piano, and Milt Jackson's dancing vibes. These are the moments that succeed in raising this Montreux Festival above the level of a routine jam session. Clark Terry is the best all-around performer on this album, he is bouyant on *Samba del Orfeo* and has a lovely solo on *God Bless the Child*. British nightclub owner, Ronnie Scott, is in fast company as he displays a hard-edged, acrid style that is a pastiche of Coltrane and Joe Henderson. The best single solo is Peterson's virtuosic work on *Pennies from Heaven*. Beginning with a restated melodic line, he gradually shifts to dazzling, single-note runs, and climaxes with a crashing chordal finalé.

*John Lissner*

Sound: B+

Performance: B+

# Top of the pile

**Tchaikovsky: Capriccio italien, Rimsky-Korsakov: Capriccio espagnol:** Arthur Fiedler & The Boston Pops. **Crystal Clear CCS-7003**, direct to disc, \$15.98.

Crystal Clear's direct-to-disc recording of the Boston Pops Orchestra, like Sheffield's recent recordings of the Los Angeles Philharmonic, is a bold move away from the multi-microphone excesses which plague most current orchestral recording. While Sheffield opted for a single stereo M-S (mid-side) microphone, Bert Whyte, the engineer on the Boston Pops sessions, chose the spaced-apart (left-center-right) microphone array which he has favored since his early days with Everest Records. In the spaced-apart array, the microphones are arrayed across the front of the ensemble with perhaps 15 feet between them. Localization results both from amplitude differences and time differences. The chief virtue of this approach is that it conveys a high sense of ambience; the listener seems to be transported into the recording environment. The M-S approach, on the other hand, relies entirely on amplitude cues for localization and generally provides more accurate imaging in the ensemble itself.

Once the microphone locations and, just as important, the arraying of the musicians were established, the recordings were made without any apparent manipulation of gain. As with all straightforward pickups, M-S or spaced-apart, things seem to work best when the playback level approaches that of the real thing. Thus, the listener had better be prepared for an extremely wide dynamic range. Those audiophiles whose systems tend to roll off at the high end may be disappointed at the lack of sheen on massed strings that we have gotten used to in more "up front" recordings. There is no doubt, however, that the sound on this record is far more representative of what one is more likely to hear in Boston's Symphony Hall, or any other good concert hall for that matter.

Purely as a matter of taste, some listeners may take some issue with the ratio of direct to reverberant sound in these recordings. Although we have all become acclimated to closer-in approaches in which musical details are often drawn out to an unnatural degree, there is no question in these recordings that the musical details are

all there and that all nuances are natural ones, entirely in the hands of Maestro Fiedler.

If your playback system extends down to the 30 Hz region, you have a very pleasant surprise in store. Part of the rollicking fun of both *Capriccios* is in the battery; the bass drum in particular is deep and solid and in perfect proportion to the rest of the ensemble. We examined the signal on the record with a Bruel & Kjaer Model 3347 1/3-Octave Real Time Spectrum Analyzer and found considerably energy during peaks rarely encountered on orchestral recordings centered in the 31.5 and 40 Hz bands. It is an unfortunate fact that most major classical record producers shy away from this kind of honest low end purely in an effort to get either more apparent level or more playing time on a disc. Part of the direct-to-disc philosophy, here as elsewhere, is to put it *all* on the disc, with both level and playing time adjusted as need be.

About the performances, all that needs to be said is that these two war horses are given good workmanlike readings; it is awfully hard to go wrong with these pieces.

One of the pitfalls of direct-to-disc recording is that you take what you get in the way of pressing quality — there are no second chances. Although these discs were pressed in Germany, presumably by Teldec, the noise level, while quite good by American standards, was high enough to be disturbing during softer passages — a minor flaw, however.

Producer Ed Wodenjak has given technical credit where it is due. Among them are Bert Whyte (who needs no introduction to the readers of *Audio*), Stan Ricker (one of the few top-flight disc mastering engineers), and John Curl (one of the best known circuit design consultants in the high fidelity industry). Crystal Clear has also singled out the Ortofon Company and its new DSS 732 stereo cutterhead used in this release. *John M. Eargle*

**Stockhausen: Zyklus pour un batteur. Teruyuki Noda: Eclogue for Flute and Percussion.** Sumire Yoshihara, percussion, Masami Nakagawa, fl. **RCA Mastering Lab RDC-1**, stereo, (45 rpm) (direct to disc).

This RCA-sponsored Japanese 45 direct-to-disc is a whiz! In this one the sounds are ideally suited to the super-

# EXPLOIT

## your cassettes with a DENON deck

Are you getting all you can from your cassettes? Denon wants to exploit tape for all it's worth.

The DR-750 exceeds the performance of most studio machines with: dual-capstan servo drive, two DC motors, Sendust heads, multiplex filter for FM recording and a front-panel "fine tune" infinite bias adjustment.

There's a whole lot more to cassette exploitation with a Denon tape deck. See your AA/Denon dealer for first-hand proof.

### American Audioport, Inc.

A DIVISION OF THE DISCWASHER® GROUP  
1407 North Providence Road Columbia, MO 65201



DR-750

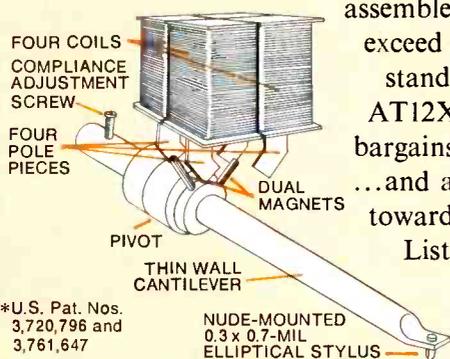
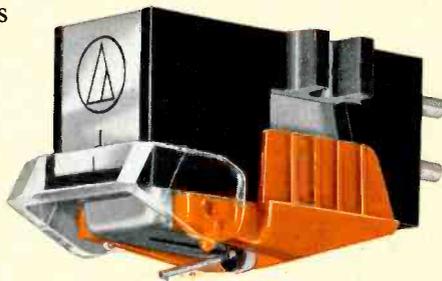
# DENON

# Q • Where should you start in your search for better sound?

## A • At the beginning. With a new Audio-Technica Dual Magnet™ stereo phono cartridge.

Our AT12XE, for instance. Tracking smoothly at 1 to 1-3/4 grams, depending on your record player. Delivers smooth, peak-free response from 15 Hz to 28,000 Hz (better than most speakers available). With a minimum 24 dB of honest stereo separation at important mid frequencies, and 18 dB minimum separation even at the standard high-frequency 10 kHz test point. At just \$65 suggested list price, it's an outstanding value in these days of inflated prices.

Audio-Technica cartridges have been widely-acclaimed for their great sound, and for good reason. Our unique, patented\* Dual Magnet construction provides a *separate* magnetic system for *each* stereo channel. A concept that insures excellent stereo separation, while lowering magnet mass. And the AT12XE features a tiny 0.3 x 0.7-mil nude-mounted elliptical diamond stylus on a thin-wall cantilever to further reduce moving mass where it counts. Each cartridge is individually



\*U.S. Pat. Nos.  
3,720,796 and  
3,761,647

NUDE-MOUNTED  
0.3 x 0.7-MIL  
ELLIPTICAL STYLUS

assembled and tested to meet or exceed our rigid performance standards. As a result, the AT12XE is one of the great bargains of modern technology ...and a significant head start toward more beautiful sound.

Listen carefully at your Audio-Technica dealer's today.

**audio-technica**  
INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 128A-2, 33 Shiawassee Avenue, Fairlawn, Ohio 44313  
In Canada Superior Electronics, Inc.

Enter No. 11 on Reader Service Card

fi process, to put it mildly — such a battery of booms, bams, socks, and other explosions you never heard, nor so well. Wotta powerhouse percussionist! It's a girl and she reminds me of that tiny black ball of fire who has been around the U.S.A. percussion circuit in recent years, starting off (where I saw her) with the National Orchestral, a New York training orchestra. She and Sumire Yoshihara should get together and blow a few fuses.

It's not only assorted percussion sounds, pitched and unpitched, that we have here. There's the modern flute, notoriously tough to record in its excruciating higher and louder registers. It's OK here if your ears can take it. Excellent pressing, very quiet — is it Japanese, or domestic RCA?

**Vivaldi: "Spring" Concerto in E (The Four Seasons); Sonata for Violin and Continuo in A, Op. 2; Concerto Gross for 2 Violins, Cello and Strings, Op. 3 No. 11 (L'Estro Armonico).** Heiichiro Ohyama, vl., Cremona Chamber Ensemble. **Sonic Arts 8**, stereo, direct to disc, via Audio-Technica.

A Japanese violinist in California and a d-to-d processing also from that state, a very good record in every way. Mr. Ohyama got his fiddle basics in Japan, went to Europe for further study, and then to Indiana University — a notable music department — for still more. Thus, in addition to being highly musical, he is well informed and plays Vivaldi not only in good style but also in the current style — for Baroque playing has changed mightily in these past years. The direct-to-disc process gives a marvelous sheen to the individual strings, two instruments in the *Sonata* (with harpsichord) and a small ensemble orchestra in the *Concerti*. The playing is lively and accurate, musical and never pretentious, especially in the solo *Sonata*, the best item on the disc. It was perhaps unwise to choose just one of the *Four Seasons*, the four concerti which are usually played together and should be but this is a minor complaint.

The solo violin is recorded rather loud, but then the entire ensemble is heard close — to and in a fairly intimate place, an excellent idea and pleasant change from too much superb-reverb. (This music *should* be smallish and current styling rightly makes it so.) So I can safely rate the balance of instruments as good. P.S. — Remarkably silent surfaces — and not a word about where they come from.

Sound: A Recording: B+ Surfaces: A

AUDIO • December 1978

# No problem.

That's what TASCAM SERIES mixing consoles are all about because whatever stage of recording development you're in, we provide the solution, not create another problem.

Our attention to "human engineering" is what keeps TASCAM SERIES number one and the functions included in our mixers demonstrate just that.

**Monitoring.** If you already have a mixer, do you have to use the input section for monitoring? You don't if you have a Tascam. Any Tascam, not just the Model 15. So when we tell you you've got 8-in on the Model 3 or 5A, you've got 8-in. Plus enough monitoring combinations to satisfy anyone in a control room or studio.

**Mixing Groups.** Problem solving is an orderly pattern of thought. Thinking it through, one element at a time, is the most logical approach. In design you find our mixing groups do just that. Each element on every console that makes the total Tascam mixer has been positioned as a group. This means that each time you operate any Tascam console you are able to logically think about what you are doing, not which knob to twist or button to push.

**Meters.** Tascam meters are not options. They are an

integral part of every mixer we make and they're less visually confusing than a lot of multi-color LED displays we've seen. Compare and see what we mean.

**Patch Points.** How flexible is your mixer? We have the simplest external patching system in the business. Period. And every Tascam mixer is designed with the same flexibility to provide access to signals and increase your ability to influence and change them to suit your individual ideas.

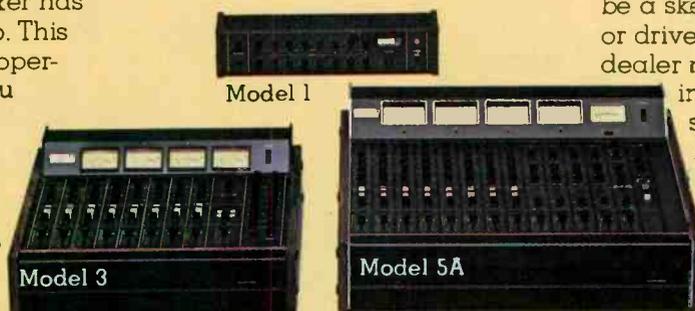
**Channel Assignments (Busses).** We believe that channel assignments should be simple and comprehensive. Simple in number and visually comprehensive. All TASCAM SERIES consoles have identical channel assignment color coding, making it easy to see to which output channel any particular input is assigned. Additionally, we have a unique panning system. Whenever any two or more channel assigned buttons are depressed, the pan is automatically engaged. If only one button is pushed, then pan is totally out of the system. Easy, simple, and terribly logical.

**A Special Note About The Model 1.** Our model 1 is really an inexpensive compact eight by two line-level mixer. It gives you the additional submixes you'll need without costing you a fortune.

Where are our specs? In the equipment, where they belong. Because hearing is believing. So be a skeptic. Pick up the phone or drive to a TASCAM SERIES dealer near you. He has all the information and a personal systems planning brochure from us to you. And remember, whatever your recording needs, the TASCAM SERIES mixers are no problem.

## TASCAM SERIES BY TEAC

A new generation of recording instruments for a new generation of recording artists.



TEAC Corporation of America • 7733 Telegraph Road • Montebello, CA 90340



TOKYO ELECTRO-ACOUSTIC CO.  
25 YEARS OF EXCEL

PS AUDIO  
Phono Preamplifier

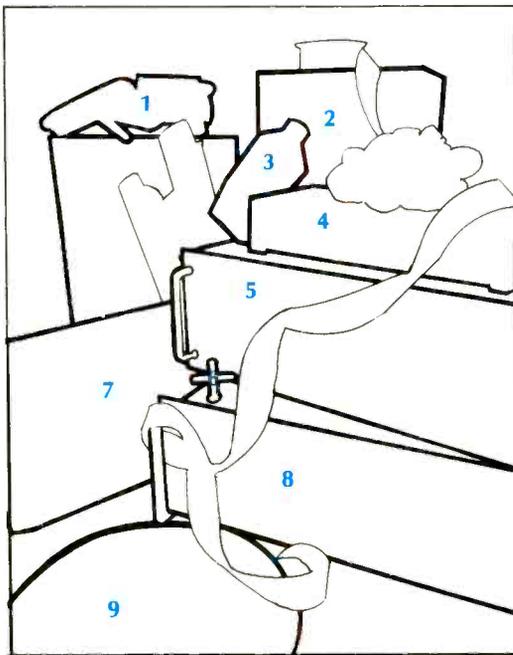
Sound System Two

Sansui  
AM/FM Stereo Tuner  
TU-717

DW  
Presto Pops

# CHRISTMAS BUYING GUIDE

Here is a group of Christmas gifts that won't put you in hock for the rest of the year. 1) Discwasher's Organizer includes the Zerostat antistatic pistol, SC-1 stylus cleaner, and Discwasher record cleaner with D3 fluid in a walnut base, \$46.00. 2) Fulton FMI-80 speakers have smooth, extended response with moderate efficiency, \$199.00 ea. 3) Realistic Sound Level Meter has a range of 60 to 126 dB with either A or C weighting, \$39.95. 4) PS Audio's PS-II phono stage offers passive RIAA EQ with high overload capability, \$119.95. 5) ADC Sound Shaper Two has 12 sliders controlling octave-wide bands for each of two channels, \$279.95. 6) Stylift can be used with any manual turntable to lift the arm at the end of the record, \$19.95. 7) TEAC's 25th Anniversary Commemorative Box contains an E-1 demagnetizer, 3-oz. bottles of head cleaner, rubber cleaner, and stainless polish, swabs, and a wipe, \$60.00. 8) Sansui's TU-717 tuner boasts 1.8- $\mu$ V sensitivity and 80-dB selectivity, \$370.00. 9) Fiesta Filipina from DW Labs has a binaurally recorded live performance of Philippine music with nearly 50 dB of dynamic range, \$12.95.



For more information, write to: 1) Discwasher, Inc., 1407 No. Providence, Columbia, Mo. 65201; 2) Fulton Electronics, 4428 Zane Ave. North, Minneapolis, Minn. 55422; 3) local Radio Shack stores, 4) PS Audio, 1529-C Stowell Center, Santa Maria, Calif. 93454; 5) Audio Dynamics, 230 Pickett District Rd., New Milford, Conn. 06776; 6) Audio Source, 1185 Chess Dr., Foster City, Calif. 94404; 7) TEAC, 7733 Telegraph Rd., Montebello, Calif. 90640; 8) Sansui, 55-11 Queens Blvd., Woodside, N.Y. 11377, and 9) Great White Whale, 348 E. 84th St., New York, N.Y. 10028.

AUDIO • December 1978

## SONUS SERIES II. THE BEST KEEPS GETTING BETTER.



The original Sonus cartridge established a new standard in high definition phonograph reproduction. Yet we believe there is even further room for improvement in this often-overlooked area of high fidelity. So we have taken the original Sonus cartridges and refined their designs, taking full advantage of the latest in materials and techniques. Sonus Series II cartridges are the result of these new design developments.

The new Sonus Gold consists of three models with identical bodies and stylus assemblies, differing only in the form of their diamond tips. The new Sonus Silver comes in two stylus types, and shares all the qualities of their more costly counterparts, yet still can offer a dramatic improvement in sound reproduction overall. Both series employ a transducer system characterized by reproduction of exceptional accuracy, clarity and definition. For full details and a recommendation of which model is correct for your particular system, we suggest a visit to the Sonus dealer nearest you, or write us.

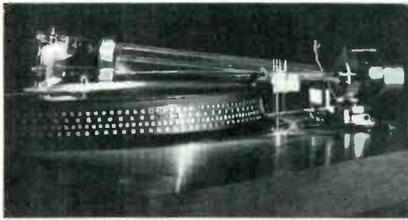
SONIC RESEARCH, INC., Sugar Hollow Rd.  
Danbury, Conn. 06810

# SONUS

High Definition Phono Cartridges

Enter No. 61 on Reader Service Card

# Stylift...an uplifting idea.



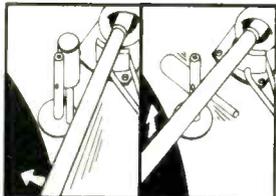
No more dropped tonearms, damaged cartridges and records. It's the Stylift — a revolutionary new device that automatically lifts the tonearm off the record surface at the end of play.

### Designed especially for manual turntables

Stylift is a unique mechanical device that uses no magnets, solenoids or photoelectric devices. The precision device is absolutely maintenance-free — no wiring is necessary and mounting the Stylift is simple and easy.

Stylift easily lifts tonearms tracking up to two grams and even has a special counterweight attachment for heavier tracking tonearms.

Stylift is made of polished chromium steel (no plastic) and will provide years of trouble-free



"protection" and convenience for your tonearm and cartridge.

### Order Now

To order your Stylift, enclose a check or money order (NO CASH PLEASE) for \$19.95 for each Stylift desired, plus \$1.50 for postage and handling. (California residents: add 6% for sales tax.) Use the attached coupon.

Please allow three to four weeks for delivery of your Stylift.

**SATISFACTION GUARANTEED.** If not completely satisfied, return within 10 days.

Stylift is distributed by AudioSource and is also available at finer audio stores.

**AudioSource**

1185 Chess Drive  
Foster City, Calif. 94404



Monitor Audio  
In Canada:  
Edon Acoustics Ltd.

Please send \_\_\_\_\_ Stylift(s) for \$19.95 each. Total \_\_\_\_\_  
Add postage and handling of \$1.50 (each). \$1.50  
(California Residents: add 6% sales tax.)

TOTAL \_\_\_\_\_

I enclose check \_\_\_\_\_ or money order \_\_\_\_\_

Charge my BankAmericard \_\_\_\_\_ Visa \_\_\_\_\_ Mastercharge \_\_\_\_\_

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

Signed \_\_\_\_\_

Mail Stylift(s) to:

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Place this coupon in an envelope along with your remittance and mail to: AudioSource, 1185 Chess Drive, Foster City, Calif. 94404. Orders received will be processed immediately; however, please allow three to four weeks for delivery.

Enter No. 9 on Reader Service Card

# Theater music

Donald Spoto



**The Act:** Liza Minnelli, Original Broadway Show, **DRG 6101**, stereo, \$7.98.

There is nothing redeeming about DRG's original cast album of **The Act**, which is, I'm sorry to report, doing a very brisk business indeed. At first hearing, this Liza Minnelli vehicle is loud and crude, sounding more like a traffic jam than a Broadway musical. Apart from the fact that the songs are sloppily orchestrated, the main problem with the John Kander-Fred Ebb numbers is Miss Minnelli herself. Her voice is unappealingly dry and hoarse, and her phrasing is noticeably unnatural and forced. The two passable songs in the show, *It's the Strangest Thing* and *My Own Space*, could probably be saved from total catastrophe if rendered by another performer.

Even worse than the content is the recording itself. It is always either too loud or not loud enough and never terribly clear. The newly-born DRG is not off to an auspicious start, either technically or contextually. I hate to scold an infant enterprise and a show that many seemed to admire, but it's time to level a critical finger at sloppiness in creation and execution.

**On the Twentieth Century.** Madeline Kahn, John Cullum, Imogene Coca and the original Broadway Cast. **Columbia 35330**, stereo, \$8.98.

Curiously, this album improves after you've seen the show; it's hard to be impressed by the disc alone, especially considering that one of the weaker numbers of **On the Twentieth Century**

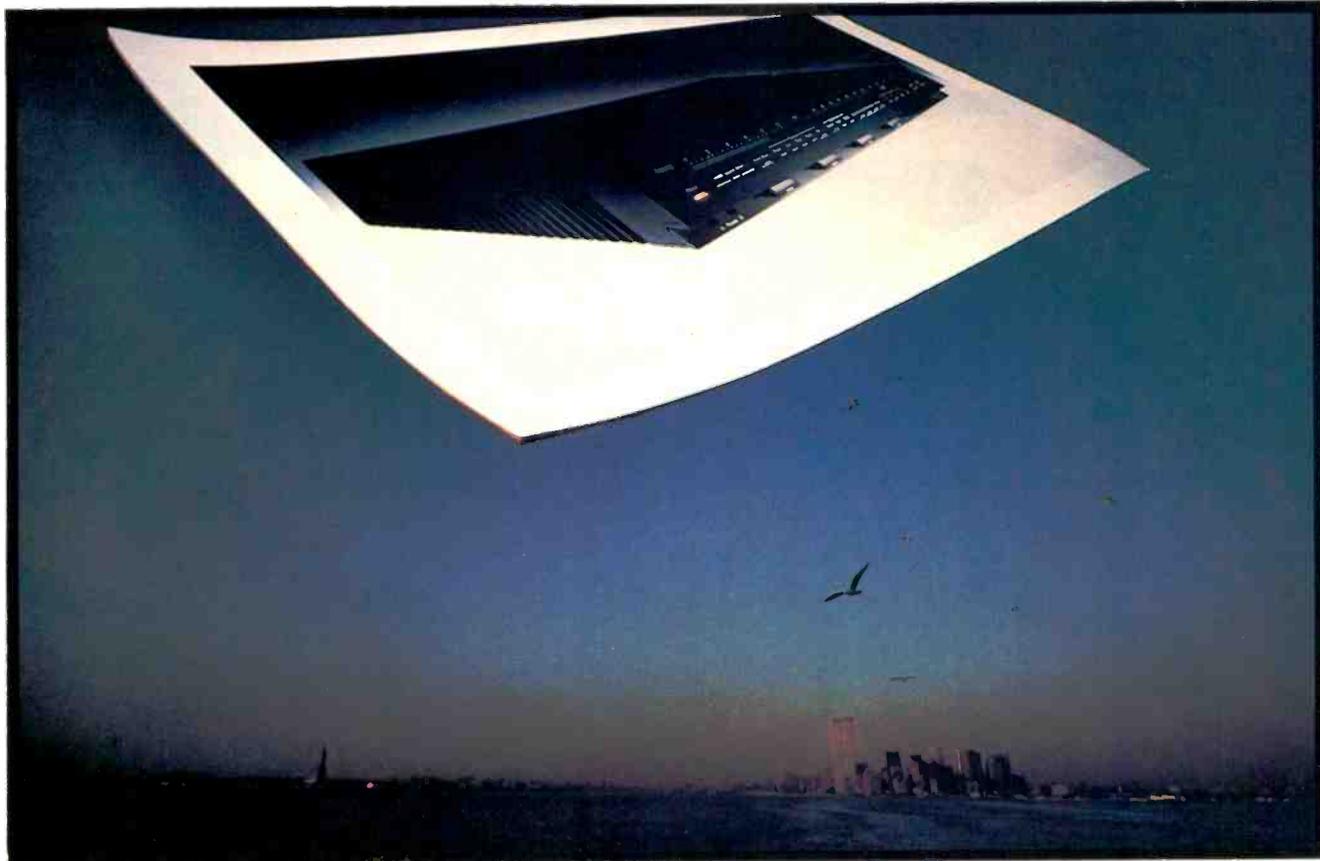
follows its booming overture. If you know the great Howard Hawks comedy film on which it's based, you're in for still another disappointment; the Ben Hecht-Charles MacArthur script is not well served by Betty Comden and Adolph Green, whose book and lyrics rarely rise above the banal.

Occasionally Cy Coleman's score does, however. The duet for Madeleine Kahn and John Cullum (in the roles created by Carole Lombard and John Barrymore) is called *Our Private World*, and it has a wonderfully intricate melodic line, deceptive in its simplicity. The voices of the principals alternately blend and contrast. And *Repent*, the comic number written for the religious nut aboard the crack train, is more subtle than Imogene Coca's delivery suggests, as she shifts arbitrarily from sub-bass to squeaky alto, creating a caricature rather than a character. The best number, however, is the Sextet, which is very close to opera, elusively witty in the style of Gilbert and Sullivan, and recalling those stirring *bel canto* finales from the 19th century.

The album, which the composer himself produced, is dedicated to the late Goddard Lieberson, who was responsible for the production of many of Columbia's great past recordings. Lieberson would have been pleased with the result here. The record is crisp, all the tones deliciously preserved. The jacket itself must have cost a bundle, as it sports over a dozen color photos in its double-fold, while the smashing show logo (by Nicholas) makes the cover itself worth the price.

AUDIO • December 1978

There's music in the air everywhere. Imagine having it all at your fingertips.



127

Imagine encountering a stereo receiver light-years ahead in styling, operation and performance.

You've never seen anything quite like it before—its timeless elegance immediately commands your attention.

You extend your hand. An effortless touch brings the entire system to life. There are no buttons to push, levers to flip, nor knobs to turn. The receiver, instead, responds to your every command at the briefest touch of its fingertip sensors.

Its awesome performance, finally, leads you to conclude that it is the product of an infinitely advanced intelligence.

You'd be surprised, then, to learn that the 730 Receiver is available on earth at a Nakamichi dealer. You owe it to yourself to see, hear and, most importantly, touch the Nakamichi 730... *especially* if you are totally satisfied with your present stereo system.

Write for more information:  
220 Westbury Avenue, Carle Place, New York 11514.



 **Nakamichi**

Products of unusual creativity and competence...

Enter No. 38 on Reader Service Card

# Classical reviews

Edward Tatnall Canby



**Mendelssohn: The Five Symphonies.** Leipzig Gewandhaus Orch., Leipzig Radio Chorus, soloists, Kurt Masur. **Vanguard Cardinal VCS 10133/6** 4 discs, stereo, \$15.92.

Am I seeing things? If these Vanguard Cardinal records are \$3.98 apiece, as Schwann indicates, then this is the biggest all-time bargain I ever ran into. At a lot higher price it still would be a remarkable buy, and maybe is, if the Schwann is a misprinting. These are every bit as good in essential respects as any four \$8.95 imports.

Five Mendelssohn symphonies, including one with large chorus and three solo voices, two sopranos, and a tenor! I admit the idea daunted me at first, and delayed my playing. Mendelssohn has an awful way of just going on and on, a million little notes with never a pause for a decent breath — at least as we all too often hear him played. Now, at last, I understand. It is a matter of HOW he is played! Phew, what a difference.

I knew all these works more or less, and a few of them very well, notably the often played *Italian Symphony*, which is the one that comes off best

and most easily. But, that one aside, I have always thought, from the performances I've heard, that the poor composer really was overworked, tired, and flagging in inspiration most of the time. He died young, of overwork in all truth. But now, now I know. It is the modern orchestra and the modern conductor! They are bored before they start and they sound it mostly until they finish . . . prejudice.

This recording comes from the famed Gewandhaus, the oldest Symphony Orchestra anywhere and always one of the best, down through 236 years to date. But much more important, in 1835 Mendelssohn himself took over this orchestra and revitalized it into one of the most exciting performing organizations of the period — it was then that he gave first performances such as that of the "Great" Schubert *C major Symphony*, previously unknown, and the revived *St. Matthew Passion* of Bach, which started off the whole Bach revival still continuing today. So in Leipzig Mendelssohn is something more than a patron saint. He is their musical George Washington, combined with Abraham

Lincoln. THAT is what you hear in these performances! A top orchestra (and chorus and soloists) uniquely inspired. Even the tinniest ear cannot fail to hear it.

I went from one to the next, through all these Symphonies, expecting each to be as usual, the plodding *Reformation*, the heavy-footed *Scotch*, even the *Song of Praise (Lobgesang)*, Number 2, as vast as the Beethoven *9th* doubled. And in each I was amazed; the music soared, the expression was as passionate and romantic as Schumann himself. Astonishing! The orchestra plays with such genuine feeling and such unanimity of ensemble that a hundred other versions are, for my ear, simply put to shame. And the chorus! I awaited its entry in *Lobgesang* with some doubt; here, surely, would be the bathos, the boredom. Instead, electric! Absolutely beautiful singing, clear and true. And then, two glorious sopranos and a heartfelt German tenor, each of them top rank as executants . . .

That isn't the end. The recording is so fine that I kept turning things up louder and louder. You guessed it. I

# NOW THERE ARE THREE TRIAXIALS® FROM THE PEOPLE WHO INVENTED THE 3-WAY SPEAKER.

The 6" x 9" Jensen Triax... the first ever.

This is the speaker that revolutionized car stereo sound. It features a separate woofer for the low tones, a tweeter for the highs, and a midrange for the middle tones... just like the better home stereo speakers.

The 5¼" Triax for front seat 3-way sound.

Another Jensen innovation. The 5¼" woofer mounts low in the front door for distortion-free bass. While a separate unit mounts high on the door, delivering sharp, clear high and middle tones from an individual tweeter and midrange.

A new 4" x 10" Triaxial for newer midsize cars.

It's specially designed to bring

3-way high fidelity to the narrower rear decks of the new midsize cars.

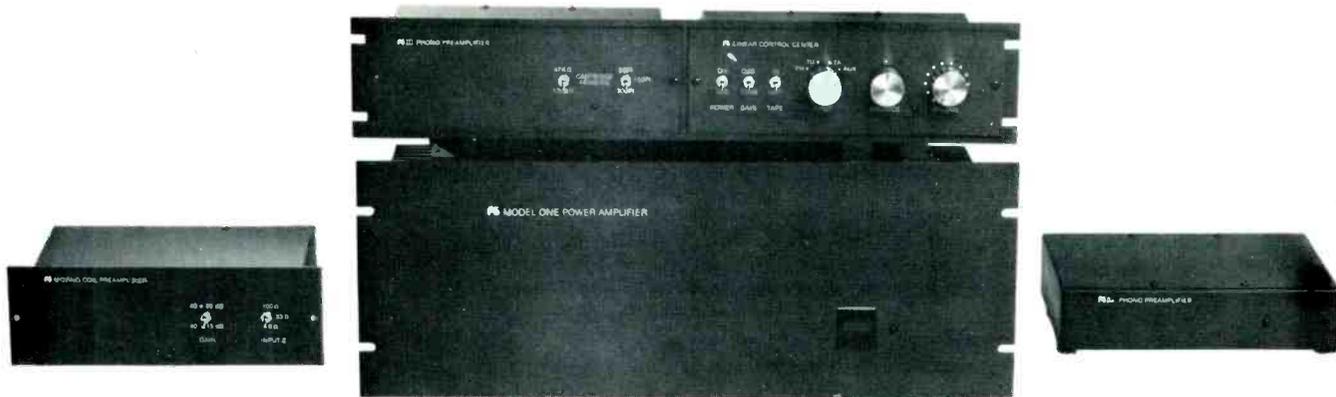
And a whole line of other quality speakers.

Jensen also offers a full line of coaxial 2-way speakers, dual cone speakers and surface mount speakers. All with the quality and great sound Jensen is famous for. And with a size and price to fit every car and wallet.



"Triax" and "Triaxial" are registered trademarks identifying the 3-way car stereo speakers of Jensen Sound Laboratories, Division of Pemcor, Inc.

**JENSEN**  
SOUND LABORATORIES  
Division of Pemcor, Inc.  
Schiller Park, Illinois 60176



## INTRODUCING THE WORLD'S BEST COMPONENT SYSTEM

Two years ago, we brought you the world's best modular phono preamp. We at PS Audio are proud to announce the availability of a COMPLETE component system based on the innovative technology we have become famous for. At the heart of this incredible system is the astonishing new PS III... a milestone in phono reproduction that **must** be experienced.

This same design is also available for moving coil cartridges and is fully equalized. Either of these preamps thru our Linear Control Center and amplifier will sound more **real** than **anything** you've ever heard. The superior design of our modestly priced components **is** audible... and we can prove it. See your dealer for details, or write direct.

130 **PS** AUDIO 1529-C Stowell Center, Santa Maria, CA 93454

Enter No. 43 on Reader Service Card

actually blew a fuse on my main amp. That, too, held up this review.

Sound: A- Recording: A to B+  
Surfaces: B-

**Weber: Grand Duo Concertant, Op. 48. William O. Smith: Five Pieces for solo clarinet. Spohr: Six German Songs, Op. 103 (with clarinet).** Melvin Warner, clar., Allan Dameron, pf., Diane Ragains, sopr. **Crystal S332**, stereo, \$7.98.

Crystal is emerging as one of the best of the many small record labels producing primarily local recital material in the classical field. This recording is a real find — the sort that keeps a long-time record reviewer alive and excited. My first impulse is simply *thanks!* — fervently. To know that our music remains alive and well (and some of it a lot better than Jacques Brel, by the way. . .).

One of the finest clarinet recordings I have yet to hear, this one. First, an unusually interesting and well-integrated "program" of works by three composers, one of them contemporary, the other two early 19th century, and second, a splendid clarinetist, one might say audibly charismatic, whose playing is a joy to hear, and along with

him two other excellent musicians, piano and voice. Good recording, too, balanced nicely to favor the clarinet but never immodestly, always cooperatively in the sound. (How many recording engineers, large and small, have yet to learn the lesson of modesty for the solo?) The piano is ever so slightly in the background; the soprano voice, more importantly, is also kept in place and never unpleasantly close or loud — which makes the vocal music itself far more easily accessible to the musical ear.

The Weber piece is one of those marvelous clarinet virtuoso items by that composer that seem as fresh as Summer peaches and cream, all smiles and felicity—yet manage also to be astonishingly brilliant and dazzling. Melvin Warner is a "natural" for such music — his clarinet even sounds like an early-type one, full of color and expressiveness; there is that sense of exultant strain, an "edge" to the tone, which we find in the best jazz playing today but seldom in classical. It is right, that exulting strain! And typical of the period. The clarinet was a wild, Romantic instrument in those days, far from the discreet, ultra-smooth elegance of the classical clarinet as mostly played today.

The Spohr songs, slightly later, are of

the type celebrated in Schubert's famous and beloved *Der Hirt auf dem Felsen*, a long concert aria of a song with clarinet obbligato and piano. These Spohr songs are charming, limpidly lovely music for the same combination, if neither as lengthy nor as intense as the Schubert. Soprano Diane Ragains has a somewhat American harshness in her louder tones but she is highly musical and, as noted above, the engineer has placed her to the very best advantage for the music. The Spohr songs fill up Side 2.

The remarkable thing about modernist Smith's music (he's the guy who can play two notes at once on his clarinet) is how easily it follows after the Weber. Huge jumps, squawks, blats, high squeaks — even so, there is no loss of interest and a considerable rapport with what has gone before. Credit goes to Smith and to Melvin Warner for his superb playing.

Sound: B Recording: A- Surface: B.

**Summer Prayer (Amemiya: Natsu Nebutsu; Monochrome Sea. Morton Feldman: The King of Denmark.** Yasukazu Amemiya, solo percussion. **RCA RVD-2154**, stereo, via Audio-Technica.

Most confusing. This RCA Japanese import features a solo percussion genius, as player and composer, and the implication is that nobody else is around—he does it all himself. Two major works of his own and a third by the American Morton Feldman (but *Summer Prayer* was composed in America). On the record jacket, however, there are listed for *Summer Prayer* no less than 111 separate musical instruments, including "mouth whistle" three times, one foot switch, one thunder sheet, one slapstick, one vibraslap, a shaker, a bongo, one musical saw, a huge array of Japanese soundmakers, a flute, and practically all the known Western standard percussions, like tam-tam, wood blocks, cymbal, string bass (!), xylophone, marimba, bass drum — all that, plus one prepared piano (!), two loudspeakers, and one tape recorder. You figure it out. Well, one picture shows the studio, and it does look like a percussion junk shop.

I liked the Morton Feldman best, and for the usual reason — he says more with less. So much Japanese music is obsessed with complexity and virtuosity! But this man is good — or his dozen or so helpers (?) are good. And the sound is good too, though there is no indication that it is either digital or direct-to-disc. I don't think much of these surfaces. Quite some background noise and a lot of tiny ticks.

Sound: A- Recording: A- Surfaces: B-

**Janet Baker sings Beethoven and Schubert.** Engl. Ch. Orch., Leppard. Philips 9500 30, stereo, \$8.95.

Our private Maxwell's Demons got to work on my review of this superb disc in the September issue and I can't let the record pass on into typographical limbo. The intense and musical Janet Baker sings Beethoven on side 1, a "WoO" work (work without opus number) — somebody didn't believe my spelling — and, heaven forbid, not a "grand Italian classic area" but an ARIA, no less; oof! How can such things happen? (Editor's Note: Well, Ed, I'll tell you . . . — E.P.) Then, topping even this work, the even grander classic Italian ARIA, *Ah perfido*, Op 65, which lost its rightful italics. Italian, after all, and shouldn't it be in italics? Anyhow, it is one of the finest Beethoven records I know and well worth the right spelling, as well as the steep price. Not to mention the equally wonderful Schubert on side 2, correctly spelled in my review.

AUDIO • December 1978

**J&R** BLANK TAPES & ACCESSORIES AT WHOLESALE PRICES!

**BLANK TAPES**

**CASSETTE TAPES**

Ampex Grand Master I C-60	\$2.14	TDK D C-60	\$1.20
Ampex Grand Master I C-90	\$2.79	TDK D C-90	\$1.68
BASF Studio C-90	\$2.69	TDK D C-120	\$2.10
BASF Professional II or III C-90	\$2.99	TDK D C-180	\$2.99
Maxell UD C-60	\$1.93	TDK AD C-60	\$1.79
Maxell UD C-90	\$2.84	TDK D C-90	\$2.52
Maxell UDXL I or II C-60	\$2.47	TDK SA C-60	\$2.22
Maxell UDXL I or II C-90	\$3.47	TDK SA C-90	\$3.18
Scotch low noise C-90 / 3 pk.	\$4.99 for 3		
Scotch Master I C-90	\$2.84		
Scotch Master II or III C-90	\$3.29		
Sony Ferrichrome C-90	\$3.58		

**REEL-TO-REEL**

Maxell UD 35-90 1800 ft.	\$5.49
Maxell UDXL 35-90B 1800 ft.	\$6.62
Maxell UD 35-180 3600 ft.	\$14.70
Scotch 212 1800 ft.	\$4.35
Scotch 207 1800 ft.	\$5.19
TDK L-1800 1800 ft.	\$5.22

Minimum Order 12 Tapes — 100% Guaranteed.

**CARTRIDGES**

**audio-technica**

AT-20 SLA	\$119.00
AT-15 SA	\$82.50
AT-14 SA	\$46.50
AT-12 SA	\$34.90
AT-10	\$12.00

**STANTON**

BR15	72.50
68TEE S	55.00
68TEE E	42.00
680EE	20.80
500EE	14.40

**EMPIRE**

2000Z	\$59.90
2000T	\$31.50
2000III	\$19.50
4000DI	\$29.90

**HEADPHONES**

**PIONEER**

SE-205	\$19.95
SE-505	\$46.70
SE-504	\$33.50
SE-500	\$39.95
SE-700	\$59.95

**SENNHEISER**

HD 400	\$24.99
HD 414	\$35.97
HD 424	\$59.95

**SHURE**

V15 TYPE IV	\$89.90
V15 TYPE III	\$63.60
M95ED	\$26.50
M95D	\$21.00
M24H (QUAD)	\$36.50
M70EJ	\$9.90

**PICKERING**

XUV/45000 (QUAD)	\$66.00
XSV/3000	\$45.95
XV15/750E	\$30.00
XV15/50E	\$20.98
XV15/400E	\$17.95

**KOSS**

PRO 4 AA	\$37.95
PRO 4 AAA	\$45.00
HV/1	\$26.87
HV/1LC	\$35.97
PHASE/2+2	\$93.00
TECHNICIAN/VFR	\$48.00
K/6A	\$14.97

**PICKERING**

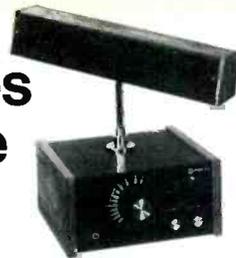
QA 7	\$41.90
------	---------

**HOW TO ORDER:** For shipment within 48 hours, send money order or certified check. Two weeks delay on personal checks. Please add \$3.50 per order for shipping & handling, \$5.50 for orders outside U.S. N.Y.S. residents add tax. No C.O.D.'s. All merchandise 100% guaranteed, brand new & factory fresh.

**J&R MUSIC WORLD**  
Dept. A, 33 Park Row, N.Y.C., 10038 (212) 732-8600  
**WRITE FOR FREE CATALOG**

Enter No. 29 on Reader Service Card

**AM Comes Alive**



The McKay Dymek DA 5 shielded ferrite loop AM antenna has a solid state preamp with tuning and sensitivity controls.

Overcomes the two most common AM reception problems: strong local stations "hiding" weaker distant stations close on the dial, and interference from TV and electrical sources.

Improves inherent long range capabilities of AM — programs listenable from over a thousand miles.

Increases signal strength 4 to 8 times — really sharpens up AM performance in typical hi-fi receivers and tuners.

Factory direct, 20-day money back guarantee. Exclusive rent/own plan available. For more information call toll free:

Nationwide 800/854-7769  
California 800/472-1783

**MK** McKay Dymek Co.  
111 South College Ave.  
P.O. Box 5000  
Claremont, CA 91711

Enter No. 36 on Reader Service Card

**Instant Link to Better Sound**

AudioSource High Definition Speaker Cable allows electrical energy to be transferred to your speaker from your amplifier with significantly reduced self-inductance and DC resistance.

Eight individually insulated wires for

each lead provides a greater surface area and more efficient signal transfer to your speakers. The end result is more sound and better sound.

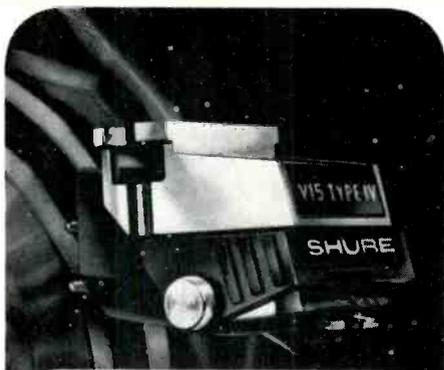
If you're looking for optimum performance, audibly improved high frequency response and freedom from distortion, hook your speakers up to a pair of AudioSource High Definition Speaker Cables.

**AudioSource**  
1185 Chess Drive, Foster City, CA 94404  
Phone: (415) 574-7585

Please send \_\_\_\_\_ pairs of FHD 7.5 (25 foot) Speaker Cables at \$25.00 per pair. Total \_\_\_\_\_  
Please send \_\_\_\_\_ pairs of FHD 15 (50 foot) Speaker Cables at \$50.00 per pair. \_\_\_\_\_  
Add postage and handling of \$1.50 (each). **\$1.50**  
(California Residents add 6% sales tax.) **TOTAL** \_\_\_\_\_  
I enclose check \_\_\_\_\_ or money order \_\_\_\_\_  
Charge my BankAmericard/Visa \_\_\_\_\_ Master Charge \_\_\_\_\_  
Account No. \_\_\_\_\_ Expires \_\_\_\_\_  
Signed \_\_\_\_\_  
Mail Speaker Cables to:  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Place this coupon in an envelope along with your remittance and mail to AudioSource, 1185 Chess Drive, Foster City, Calif. 94404. Orders received will be processed immediately; however, please allow three to four weeks for delivery.

Enter No. 70 on Reader Service Card



## fact: the IV does more... much more!

Era IV begins! The new Shure V15 Type IV phonograph cartridge is an altogether new phono cartridge system that exceeds previous performance levels by a significant degree — not merely in one parameter but in totality. The Type IV offers:

- Demonstrably improved trackability across the entire audible spectrum.
- Dynamically stabilized tracking overcomes record-warp caused problems, such as fluctuating tracking force, varying tracking angle, and wow.
- Electrostatic neutralization of the record surface minimizes clicks and pops due to static discharge, electrostatic attraction of the cartridge to the record, and attraction of dust to the record.
- An effective dust and lint removal system.
- A Hyperelliptical stylus tip configuration dramatically reduces both harmonic and intermodulation distortion.
- Ultra-flat response — individually tested.

### V15 Type IV **SUPER TRACK IV**<sup>™</sup> Stereo Dynetic<sup>®</sup> Phono Cartridge

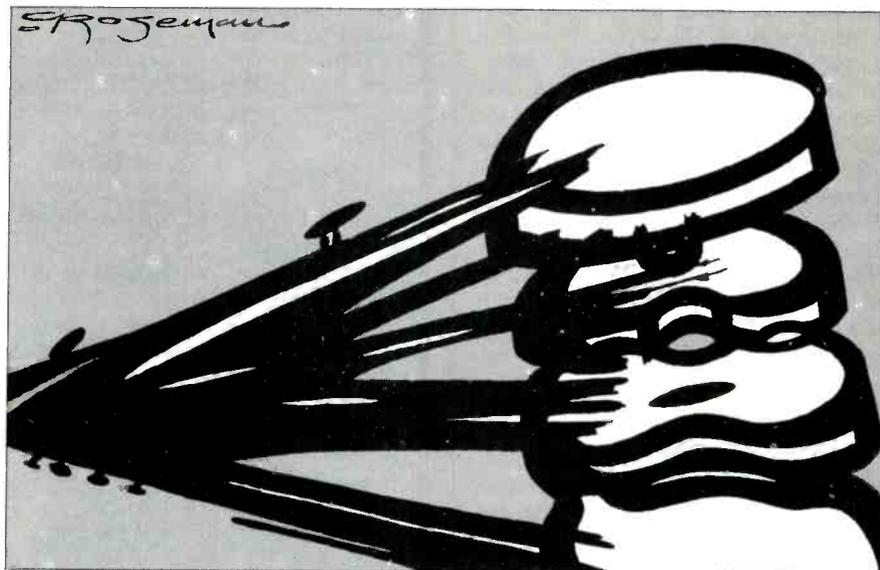
For complete details on this remarkable new cartridge write for the V15 Type IV Product Brochure (ask for AL569) and read the exciting facts on the V15 IV for yourself.



Shure Brothers Inc.  
222 Hartrey Ave., Evanston, IL 60204  
In Canada:

A. C. Simmonds & Sons Limited  
Manufacturers of high fidelity components, microphones, sound systems, and related circuitry.

# Folk bag



#### Merchants Lunch: Red Clay Ramblers Flying Fish FF055, stereo, \$7.98.

A few years ago, an old-timey revival string band called the Red Clay Ramblers recorded an album for Folkways Records. They were proficient and spirited, but not all that different from a number of old-timey bands featured on Folkways.

Then they switched labels, made a couple personnel shifts which added significant new instruments and personalities to the band, played for and acted in a New York stage production, and began making music that gravitated further and further from their North Carolina origins. Now, with **Merchants Lunch**, the Red Clay Ramblers firmly establish themselves as America's premier "whatzit band."

If you don't know what a whatzit band is, listen to the first three cuts and you should begin to get the idea. The title tune is an "old timey rag hokum vaudeville country jazz rock'n'roll" whatever, with a trucker lyric worthy of Dr. Demento, crisp 20s-jazz muted trumpet, and an unorthodox blend of fiddle, banjo, and piano. This is followed by *A Beefalo Special*, in which a bizarre crazy-scat a cappella vocal intro gives way to a rip-sno-tin', neo-stringband instrumental spotlighting swooping jazz fiddle by Bill Hicks, staccato Jim Watson mandolin, and decorous piano ripples by Mike Craver. *Woman Down In Memphis* is a long-forgotten Carson Robison/

Frank Luther gem with a slinky strip-joint rhythm, a full-bodied and boozy trio vocal, and sleazy muted trumpet by Jack Herrick. If you'd care to pigeon-hole these three cuts into an already existing musical category, be my guest. It sounds like "whatzit" to me.

To prove they haven't fallen completely off the deep end, the Ramblers also do several great old-timey numbers. The Galax-flavored *Molly Put the Kettle On* reminds me of *The Eighth of January*. Charlie Poole's raggy *Milwaukee Blues* is sung by Watson in his inimitable razor-sharp tenor. Dave Macon's *Rabbit in the Pea Patch* romps from beginning to end. Side two, band three is an intriguing medley which starts in Ireland (*Kildare's Fancy*), shifts to a Celtic-flavored American tune (*Ships Are Sailing*), and winds up squarely in the Appalachians (*High Yellow*). *Daniel Prayed* is another in the Ramblers' continuing series of a cappella shape-note hymns.

Fragile-voiced Mike Craver's Tin Pan Alley orientation shows itself on an Ian Whitcomb-reminiscent solo version of *Melancholy. I've Got Plans*, with its nostalgic melody, steady tenor guitar rhythm, and Craver's pop-piano interlude, also has a distinct 20s flavor, though the offbeat lyrics give it away as an original by the band's banjoist and dominant personality, Tommy Thompson. Fats Waller's *Sweet and*

Slow, with an extended piano/trumpet/fiddle intro and a euphonious harmony vocal is a fitting conclusion to what should go down as one of the landmark albums of folk-rooted eclecticism. Don't miss it, whatever it is.

Tom Bingham

Sound: B +

Performance: A -

**Live At McCabe's:** Byron Berline and Sundance

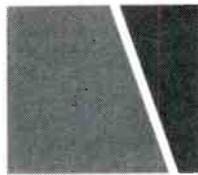
**Takoma D-1061**, stereo, \$7.98.

There's so much incredible picking on this album, I wish I could give it an unhesitant recommendation. Unfortunately, something very important is missing — that indefinable spark called "feeling."

Perhaps the trouble is these musicians have so finely honed their technical skills, that it's all too easy for them. They leap into a tune, flash away at top speed for a few minutes, then leap back out. The audience at Santa Monica's fabled McCabe's Guitar Shop is understandably dazzled by it all. But the home listener can't help but notice the absence of any true emotional commitment, the common element which lies at the heart of all great bluegrass, past or present.

If such considerations don't bother you, or if you're able to appreciate instrumental facility for its own sake (admittedly, the thing that keeps me returning to the album, despite my reservations), you should find much to your liking here. Vince Gill stands out with consistently inventive mandolin breaks; *Tear Drops In My Eyes*, *Free Born Man*, and *How Mountain Girls Can Love* provide excellent examples of his work. Berline's Texas-rooted fiddling and Dan Crary's flatpicking are, as usual, awesome, while the other guitarist, Allen Ward, is no slouch either. Banjo ace John Hickman can no doubt dash off long strings of three-finger rolls in his sleep. Dobroist Skip Conover is the band's most concise soloist, while his glissandos add much to the ensemble sound.

The singing combines the pop-influenced, California newgrass of the Country Gazette (the band most responsible for Berline's current fame) with harmonies more attuned to traditional bluegrass. A substantial portion of the material comes from the classic masters (including two songs each by Bill Monroe and Reno and Smiley), though *Free Born Man* was penned by Keith Allison and Mark Lindsay of Paul Revere and the Raiders fame. Interestingly, the 50s-grass favorite, *Good Woman's Love*, gets a mellow newgrass ballad treatment, while *Free Born Man* is done in a neotraditional

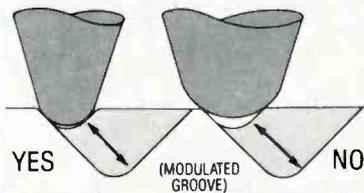


# fact: a stylus tip does not a cartridge make. so why all the fuss?

The stylus tip is only part of the complex stylus and cartridge structure, and performs a single function — it positions the entire stylus assembly so that all groove undulations are traced without damaging the record. The production of a top-quality tip calls for exquisite micro-craftsmanship, precision polishing, unwavering uniformity, and exact orientation. *(However, important as it is, an exotic diamond stylus tip configuration simply isn't a cure-all for what might ail an otherwise deficient cartridge, regardless of high-flying claims you may have heard or read.)*

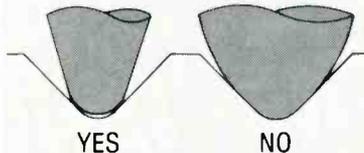
Here are the basic criteria a top-quality stylus tip must meet:

## IT MUST FIT THE MODULATED GROOVE

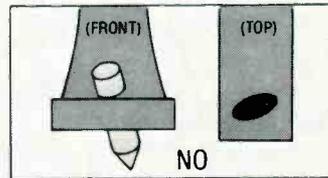
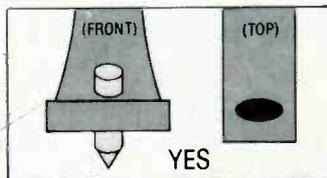


If the tip is shaped so it's oversized at its contact points, it can rise out of the modulated groove (the arrows indicate modulation of one groove wall) and "crest" at the record surface, causing extreme distortion and noise.

## IT MUST NOT "BOTTOM" IN THE GROOVE



A slightly-undersized or too-pointed stylus tip may ride the groove bottom, lose contact with the groove walls, mistrack, and generate high noise levels.



## IT MUST BE CORRECTLY ORIENTED

Skewed or rotated orientation introduces distortion.



## IT MUST BE A GENUINE SHURE STYLUS

For unwavering uniformity, look for the name "Shure" on the grip.

Please send for our "Scientific Study of Competitive Styli" booklet (AL548) explaining the important specifications all Shure styli are required to meet.



## High Fidelity Cartridges & Replacement Styli

Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60204. In Canada: A. C. Simmonds & Sons Limited  
Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

# 3 GREAT NAMES

# 1 GREAT PRICE

# \$144

## AKAI

GX702D  
Front Load  
Cassette Deck



## SONY

PSX5  
Turntable



## JBL

L36



**We Stock Over 60 Brands for Home & Car**

**ALL DISCOUNTED:** Pioneer Teac Sharp Jensen  
Marantz Sony Koss Dual  
Sansui DBX Akai ESS  
Kenwood Phase Linear Sanyo JVC

# WDS

WISCONSIN DISCOUNT  
**STEREO**

madison, wisconsin 2517 whalen lane

**TOLL FREE**  
**800-356-9514**

Enter No. 69 on Reader Service Card

assessment of their ability to communicate with contemporary audiences (see *Audio*, November, 1976).

The three albums under discussion here demonstrate that a substantial audience remains for the Bolick's simple, timeless Appalachian sensibilities. Moreover, they illustrate that the music is too vital and meaningful to be dismissed as merely a fossilized relic of a forgotten past. The more one listens, the more one realizes that the Blue Sky Boys' music has retained its value not just as entertainment but as the cultural expression of a generation, an environment, and a worldview which has too often been ignored in our increasingly complex, urbanized society.

Continuity is the hallmark of the Bolick brothers' artistry. The elements of the classic Blue Sky Boys' style — their poignant close-harmony singing, Bill's rippling mandolin tremolos, Earl's spare thumb-picked guitar backdrops, the duo's reliance on songs and ballads extolling basic, upright moral sentiments — have remained virtually unaltered over a 40-year span. Perhaps that's the key to their appeal — the world and virtually everything in it rapidly changes, but the Blue Sky Boys' fidelity to traditional values stays constant through the years.

The County album is derived from private rehearsal tapes recorded in Bill Bolick's den in 1963, without any intention of eventually releasing them. Five of the 10 songs were never commercially recorded by the Bolicks. The whole album benefits from an air of relaxed informality and unself-consciousness quite unlike their drier studio recordings of the 30s. Highlights include country standards like *The Little Paper Boy* and *Don't Let Your Sweet Love Die*, plus the appropriately titled hymn *Beautiful*. Given the circumstances, the recording is much better than you might expect, though the vocals are sharp-edged and the pressing rather crunchy. County Records, P.O. Box 191, Floyd, VA 24091.

The JEMF record is a reissue of an album the Bolicks did for Capitol in 1965. None of the songs appear on any other Blue Sky Boys recordings, even though several are intriguing variants of very well-known folk standards . . . for example, *Jack O'Diamonds*, *Oh, Marry In Time*, and *Will the Circle Be Unbroken*. Performances are impeccable and the recording is excellent. The accompanying booklet provides full documentation for each song, as well as an insightful examination of the Bolicks' career, and an autobiographical essay by Bill Bolick. Incidentally, no mention is made of a bass player, though one is clearly audible through-

136

## Audio Transformers

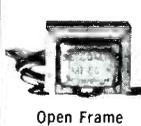
The SESCOM "MI-Series" Audio Transformers are specifically designed for broadcast and recording applications.

**FEATURES**

1. Low distortion < .2% @ 30 Hz
2. Broad frequency response ± 1 db 20-20KHz
3. Electro-static shielding
4. Six power levels: -40, -30, -10, +4, +18 and +30 dBm
5. Various primary and secondary impedances
6. Double and single mu-metal shields
7. Both shielded and open versions.



Shielded Terminals



Open Frame



Plug-In



Wire Leads

SEND FOR YOUR FREE COPY OF OUR NEW CATALOG

We also manufacture direct boxes, Mic-splitters, snakes and audio modules



"Quality Engineered Sound Products"

**SESCOM, INC.** P.O. Box 590,  
12931 Budlong Ave.,  
Gardena, CA 90247 U.S.A.  
(213) 770-3510, (800) 421-1828  
TWX (910) 346-7023

Enter No. 53 on Reader Service Card

## 8 IMPORTANT REASONS WHY MORE PEOPLE BUY TOP QUALITY EQUIPMENT FROM INTERNATIONAL HI-FI THAN ANY OTHER MAIL ORDER COMPANY

**MORE THAN 80,000 CUSTOMERS NATIONWIDE**

1. Guaranteed lowest price . . . you pay same price many dealers pay.
2. No-risk, no-deposit . . . phone orders shipped C.O.D. or Credit Card.
3. Same day shipping when ordered by 1 p.m.
4. Seven audio advisors provide professional help for the inexperienced buyer.
5. Fully insured shipments plus full manufacturers' warranty.
6. Exclusive "no lemon" guarantee.
7. Fully staffed customer service department.
8. Over 70 top name brands . . . equipment most mail order and discount dealers can't supply.




## CALL NOW

# (301) 488-9600

**Mon.-Fri. 9-9, Sat. 9-4**

Write for: • Brochure with prices and lines  
• Tips on buying by mail



**International Hi-Fi Distributors**

Moravia Center  
Industrial Park, Dept. A12  
Baltimore, Maryland 21206

Enter No. 28 on Reader Service Card

out. Available from the John Edwards Memorial Foundation, Inc., Folklore & Mythology Center, University of California, Los Angeles, CA 90024.

The Rounder album was recorded in 1975. If any stylistic change can be detected, it may be that Earl's baritone lead vocals are more forceful, though Bill's tenor parts are as tight and resourceful as ever. Again none of the songs have been previously recorded by the brothers. There seems to be an even greater preoccupation with songs about death than ever, but as always they include a few hymns to hold out a glimmer of hope, if only in another world. The mono sound is exceedingly clear, with more body and presence than many modern stereo recordings; indeed, Earl's guitar has never been heard so explicitly, or with such resonance. Rounder Records, 186 Willow Ave., Somerville, MA 02144.

Tom Bingham

**Blue Sky Boys (County)**

Sound: C Performance: A-

**Presenting**

Sound: A- Performance: A

**Blue Sky Boys (Rounder)**

Sound: A- Performance: A

**For My Friends of Song: Betty Smith June Appal JA018, stereo, \$6.98.**

Betty Smith's gentle way with Appalachian songs and folk ballads first gained attention on a Folk-Legacy album entitled **Songs Traditionally Sung in North Carolina**. Unfortunately, that dry, rather academic-sounding title probably scared off a lot of people who would have otherwise been captivated by the artist's marvelous singing. This second Betty Smith album is, if anything, even more exquisite than her debut.

Her voice is lovely — clear, sweet, with a hint of a Southern twang, yet inviting comparisons with Joan Baez' early Vanguard recordings. But Betty is older, more mature, her phrasing finely honed, and her approach to a lyric highly refined. Nevertheless, she never sacrifices the feeling and sensitivity needed to communicate the timeless truths of the old ballads to the modern listener.

Her guitar and mountain dulcimer accompaniments are well crafted and aesthetically complement her singing. On several cuts, she plays psaltery (sort of a hammered dulcimer which is plucked instead of beaten) in a style derived from Fiddler Beers. Her touch is impeccable, and her settings entrancing, with an effect not unlike a quietly rippling Irish harp.

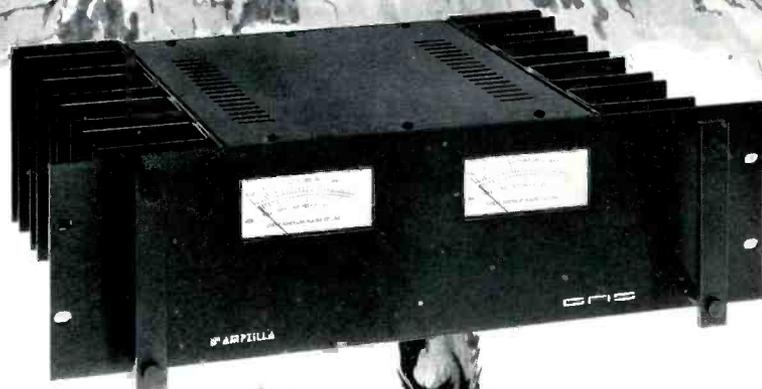
John McCutcheon — who seems to pop up on every June Appal record as producer, performer, or, as in this case, both — adds textures and backdrops on a number of instruments. Other guest appearances include June Appal boss Jack Wright's archaic banjo on *The Ballad of Bascom Lunsford* and Grey Larsen's Oriental-sounding wood flute on *The True Lover's Farewell*.

The songs cover a wide range, from attractive reworkings of old warhorses (*Bury Me Not on the Lone Prairie*, *Little Liza Jane*) to contemporary songs (Jean Ritchie's *Black Waters*, Barry

Etris' haunting *Softly Came the Gypsy*). Other standouts include the unaccompanied Child ballad *Lady Isabel and the Elfin Knight*, the Appalachian *Little Margaret* (which uses the *Shady Grove* melody), the instrumental *Gentle Maiden* (a skillful blend of Smith's psaltery and McCutcheon's hammered dulcimer), and *The Rolling Hills of the Border*, with its gorgeous psaltery part.

On most cuts, the recording is clean, with an appropriately soft focus. On a couple psaltery cuts, though, the voice has a slightly hollow sound. Surface

# The Dawn of Civilized Sound



A shining example of advanced power amplifier technology, the Son of Ampzilla features state-of-the-art performance and specifications. They are identified as being unmistakably the offspring of its world famous father, Ampzilla.

The Son's power, 80 Watts per channel into 8 Ohms (20Hz to 20KHz, 0.08% THD), will *double* into 4 Ohms and *triple* into 2 Ohms. This outstanding feature is particularly useful for driving multiple speaker pairs and for expanding Son's power capabilities up to 300 Watts when used as a bridged pair.

At the heart of Son's circuitry is its Complementary-Symmetry design coupled with Class A operation at low levels. But what makes the Son sound so clearly superior is its ability to drive a variety of complex reactive loads (such as electrostatic transducers) with ease. Exceptional stability and excellent sonic virtues have made the Son of Ampzilla GAS Company's most popular product.

To learn more about this sensible amplifier and all the members of the GAS family, write Great American Sound Co., 20940 Lassen St., Chatsworth, CA 91311. Or call (213) 998-8100. It's that civil.

**GAS**  
THE GREAT AMERICAN SOUND CO., INC.

noise is moderate, but the album's quiet nature makes it that much more obvious.

Available from June Appal Recordings, Box 743, Whitesburg, KY 41858.

Tom Bingham

Sound: B Performance: A

### Pacific Rim Dulcimer Project

Biscuit City BC 1314, stereo, \$6.98.

Those of you who consider the Ap-

palachian dulcimer a rather limited instrument — suitable for gently strummed ballad accompaniments, an occasional adapted fiddle tune, and little else — should find this album a real ear-opener.

**Pacific Rim Dulcimer Project** features five expert dulcimerists along with multi-instrumentalist Michael Hubbert, performing solo and in various combinations. Together they explore the amazing versatility of the dulcimer, introducing the instrument

to new musical contexts and technical innovations.

Of the five, Neal Hellman most closely carries on the traditional methods of dulcimer playing. Hear his version of the French-Canadian *C'est L'Aviron Qui Nous Meme en Haut*, and his duet with autoharpist Max Krimmel, *The Black Nag*, in which the two instruments mesh like a small plucked-string orchestra.

Michael Rugg forms a snug duo with Hubbert (on fiddle, whistle, and mandolin). Rugg's catchy originals, *Pack Up Your Liver* and *Mojo Clock*, sounds as if they began life as *John Hardy* and *Three Blind Mice*, respectively. They also perform tight arrangements on the Irish *Tralee Jail* and a *Swedish Fiddle Tune*.

Bonnie Carol, who coordinated the project, takes her dulcimer on a sunny Caribbean cruise in her version of Pete Seeger's *Living In the Country*. Her original composition, *Joellen*, is a very pretty, Oriental-flavored tune with captivating string harmony.

The most distinctly contemporary utilizations of the instrument come from Albert d'Ossche' and Robert Force. *Wellyn*, co-written by the two, would not sound out of place with a jazz-rock rhythm section underneath it. The two's forceful dulcimers are played with precision, feeling, and a well-developed sense of coordination. On *Firenze*, the resultant splash of string colors sounds very much like an autoharp. *Cornwall*, by d'Ossche' alone, is an intricate, skillfully executed fingerpicking instrumental. Force also wrote and sings two songs (*Poker Face Smile* and the entrancing *Sing Sailor*), but his sharply twanging, tremulous voice is an acquired taste. (Indeed, the vocals throughout the LP are far less captivating than the playing).

Also included are two highly successful ensemble experiments. *Lotus Eater Blues*, with three dulcimers, electric bass (N.C. Bull), and percussion, is reminiscent of 60s San Francisco rock; Force's lead dulcimer sounds astonishingly like a sitar. On *The Pig Song (Marjorie)*, three different styles of dulcimer, violin, whistle, and multi-tracked percussion enter a layer at a time to evoke a dulcimer equivalent of the New York Pro Musica.

The dulcimers have a beautifully crisp ring to them. All the parts are easily distinguishable and intelligently balanced on the multi-instrument tracks.

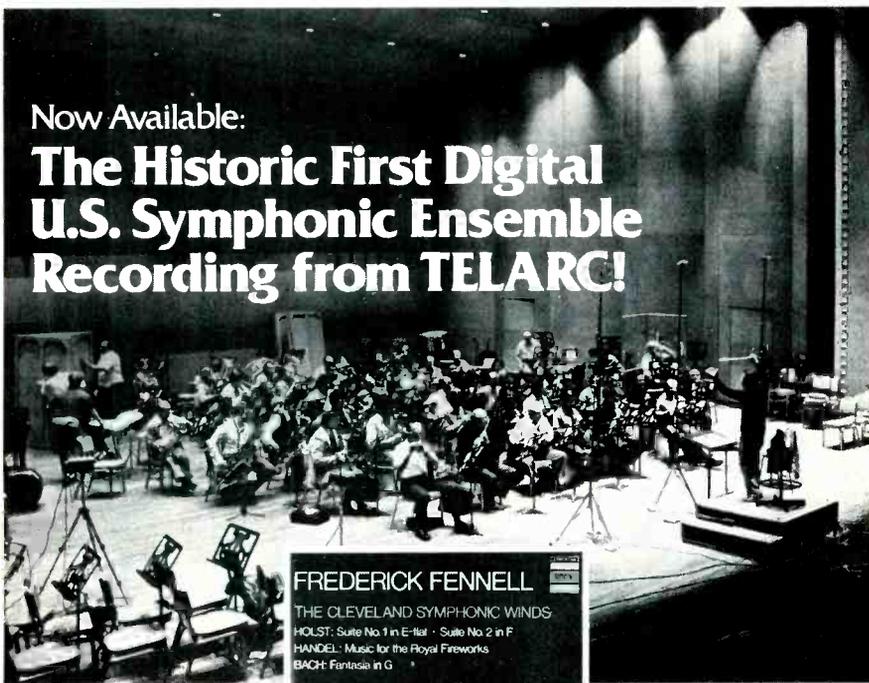
Available from Biscuit City Enterprises, Inc., 1106 East 17th Ave., Denver, CO 80218.

Tom Bingham

Sound: A- Performance: B+ to A

Now Available:

## The Historic First Digital U.S. Symphonic Ensemble Recording from TELARC!



Stereo No. 5038 \$14.95

The place: Severance Hall in Cleveland, Ohio, highly respected for its superb acoustics. The date: April 4 and 5, 1978. Fifty nine musicians, including the entire reed, brass, and percussion sections of the Cleveland Orchestra, gathered to participate in a unique and significant first symphonic ensemble recording using a sophisticated new method of *digital* recording.

The music, by Bach, Handel, and Holst, was symphonic band music at its most exciting. The Cleveland Symphonic Winds were conducted by the leading figure in wind music today, Frederick Fennell. His early recordings on Mercury with the Eastman Symphonic Wind Ensemble helped launch the hi-fi era, and are still treasured by collectors. But the consummate artistry of the Cleveland Symphonic Winds under Fennell's direction must be heard to be believed.



It was the Soundstream digital recorder that gave special importance to this major musical event. Unlike ordinary tape record-

ers, binary numbers rather than the original electronic waveforms are used for signal storage. This process eliminates problems of noise and tape saturation and maximizes the potential for wide dynamic range, extended frequency response and low distortion.

No matter what type of system you own, this record will sound impressive, both sonically and musically. The reaction by the musicians themselves, on hearing the playback, was best summed up by Frederick Fennell (as quoted in *High Fidelity*): "I'm glad to have lived long enough to have recorded that kind of sound!"

A new and exciting era in digital recording is waiting for you today at your Audio-Technica dealer or wherever the finest records are sold.



**StandardDisc™**  
INTERNATIONAL REFERENCE SERIES

Superb technical quality is the hallmark of all StandardDisc recordings, including digital, direct-to-disc, and advanced analog techniques. If not available locally, write for ordering information and current catalog.

AUDIO-TECHNICA U.S., INC., Dept. 128A, 33 Shilawasse Avenue, Fairlawn, Ohio 44313

John S. Wright

# European records

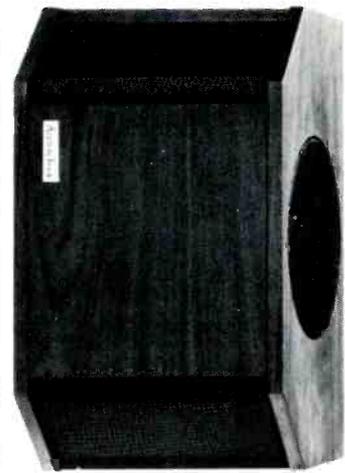
It seems that nearly all the record companies are suddenly issuing guitar music — not electrical but acoustic! The virtuoso Andres Segovia plays a selection of arrangements for guitar, amongst which is the particularly effective Schumann's *Album for the Young Op. 68* on RCA RL 12602. Recorded in his home, the sound is a bit on the dry side with finger action clearly audible. Nevertheless, this is musically a delight for those who will accept such instrumental transpositions. Guitar music from Philips comes in the form of a selection of mainly Spanish music performed by Pepe Romero (9500 295). Being popular music, it is close but ultra-clean. Although not too dead an acoustic, his clinical performances provide good demonstration material. For Erato's contribution to the guitar collection, I chose their record of *Music for Two Guitars* which includes well known works by Scarlatti, Debussy, Rodrigo, et al. (STU 70794). This is very close indeed and could be disturbing if it were not for the thoroughly enchanting music. Played at a low level, a somewhat "in the room" presentation can be achieved — as though the performers were actually there, rather than the listener being taken to another environment.

A fair share of new piano releases as well . . . . Needless to say, Brendel's insatiable energy provides yet another winning album. Firstly we applauded his Beethoven, then his Schubert, and now again his Bach. This latest record contains the *Italian Concerto*, the *Chromatic Fantasy*, and *Fugue in D minor*, and accompanying *Choral Preludes*. The sleeve notes consist of an interesting interview with Alfred Brendel by Terry Snow. On Philips 9500 353, the usual superb standards are maintained, perhaps with interpretation verging on the romantic and recorded in an even more than usually live setting. Also on the Philips label (6500 395) Claudio Arrau provides a not unduly sentimental Schumann recital. The tone is rather thinner, but more than acceptable and particularly suited to the *Kinderscenen Op. 15*. Peter Frankl also provides us with a performance of this work together with *Sonatas for the Young* and much else

in his recital of **Schumann Piano Works Volume 2** on Turnabout TV 37100-2S (three records). Originally recorded by Vox the sound is adequate, although rather dry. If perhaps not inspired, the impassioned performances are very much to my liking — particularly at the bargain price the box set is offered. And talking of bargain prices, admirers of Julius Katchen should note that his 1964 performances of the Brahms piano works are available in three separate volumes on the Ace of Diamonds label, the numbers being SDD 532, 533 and 534 respectively. Although much more likely to be purchased for the music than the fidelity, these recordings have aged well with only slight variations in quality between sides.

Still with reference to reissues, a recording made of Simon Preston playing the organ of Westminster Abbey appears on Argo ZK 14. This remains an exceptional record for its sense of a large acoustic and extended low frequency response. Also the background noise is low. Lionel Rogg is recording the complete organ works of Bach for EMI. **Volume 1** is now out on SLS 5087. Since different works have been recorded on different organs it is impossible to be specific with regard to tonal quality but overall the set of five records is light rather than thickly textured. Low frequencies are not particularly extended nor is the ambience convincing. Although Rogg takes a pacey interpretation to many of the works, his expertise is not flamboyant. Obviously a venture of this magnitude is very much for the specialist record collector, but on the basis of the first volume I can at least assure him of excellent surfaces and pressing quality.

Some issues ago I recommended an Argo record of Robert Tear (tenor) singing songs by Aaron Copeland (ZRG 8621). Robert Tear is now accompanied by Timothy Walker playing guitar in a selection of folk songs by Britten, Walton, and Seiber on ZK 39. This unusual combination bears great similarity to the earlier record being, if such is possible, excitingly relaxing performances, almost completely devoid of any strain. Quite differently, EMI has brought the voice of Robert Lloyd forward, positioned just in front



\$195\*

## ALLISON: FOUR

"Listen to the Four if you possibly can. It is worth hearing — even if you are not shopping for a speaker — just for a demonstration of how good a small box can sound."

ALLISON ACOUSTICS 7 Tech Circle, Natick, Massachusetts 01760

Hirsch-Houck Laboratories — Equipment Test Reports  
STEREO REVIEW June 1978. Copyright Ziff-Davis Publ. Co.  
\*Higher in the South and West.

139

**THE  
LIGHTEST  
HEAVYWEIGHT  
YOU'LL EVER  
WEAR**



140

You'd almost have to stick your head in the middle of an actual recording session to hear and feel the kind of heavyweight sound that the Superex SM-700 can deliver. But physically, our phones are truly lightweight. 10 oz. excluding cable. Along with our suggested lightweight price of \$65.00, we can't think of a better addition to your existing equipment that would improve your listening experience as much.

The SM-700 is dynamic. But if you closed your eyes, you'd swear that the highs were coming from an electrostatic. You see, we've found a way to combine the higher frequency responsiveness of an electrostatic with the convincing bass of a dynamic. We can't tell how here, but we'd be glad to send you more details. Better yet, your local Superex dealer will be happy to demonstrate the SM-700. He's a heavyweight, too!

**SUPEREX**  
WE DELIVER SOUND WITH PRESENCE

Superex Electronics Corp.,  
151 Ludlow Street, Yonkers, NY 10705  
(914) 965-6906

Enter No. 60 on Reader Service Card

of pianist Nina Walker, in an intimate atmosphere for their selection of sea shanties and associated songs, simply named *Sea Fever* (ASD 3545). The very masculine bass voice of Lloyd well enhances the rip-roaring fun behind these ballads, but retaining a sense of feeling. Only some slight pre-echo, mostly between tracks, mars this entertaining recital. Much more of the original acoustic than we are accustomed to hear from Decca is retained in their spacious presentation of Spanish songs sung by Pilar Lorengar accompanied by Alicia de Larrocha (piano) on SXL 6866. With almost perfect integration between voice and piano, this is a record which is hard to resist.

It is not without some reservation that I recommend EMI's recording of the Poulenc *Concerto for organ, strings and timpani* and *Concert Champetre for harpsicord and orchestra* on ASD 3489. Simon Preston is in both cases the soloist with the London Symphony Orchestra conducted by Andre Previn. Musically it is enthusiastically performed in a manner that one might expect of Previn. Technically it is most competent in a way you would expect from Parker and Bishop. Nevertheless, there is an edge of brightness combined with some grittiness in the sample pressing that causes me to hesitate from giving it an irrevocable recommendation, but nevertheless feel that it is of such merit as must be drawn to the reader's attention.

Last quarter I had reason to mention, yet again, the Philip Jones Brass Ensemble and this quarter is no exception. A slight deviation from their usual repertoire is a special arrangement by Elgar Howarth of Mussorgsky's *Pictures at an Exhibition* on Argo ZRG 885. It is really quite remarkable how this work lends itself to these superb fat brass sounds recorded in rich acoustics. Although the surface of the review pressing was poorer than average, this, together with their record *Renaissance Brass* (ZRG 823), exemplifies the finest of their work and the best of Argo engineering.

Neville Marriner, this time conducting the Concertgebouw Orchestra, has completed the newest recording available of Holst's popular suite *The Planets*. On Philips 9500 425, I find this to be a not very forceful interpretation, but on repeated playings suspect that its appreciation will be longer lasting. It is not overtly dynamic in the manner to which this work so often lends itself, also not being as distantly recorded as most Concertgebouw discs. Although the brass is especially crisp, the whole production isn't one that



jumps up and says "listen to me, I'm hi-fi." Therefore it is likely to unsettle as many people as it is likely to please. A quite contradictory approach is taken by EMI in the new recording of the Sibelius' *Symphony No. 2* played by the Bournemouth Symphony Orchestra conducted by Paavo Berglund. This is a determined performance with a high cutting level, subsequent low noise, and a wide range, which is not exemplary in detail in the bass due to some wooliness, but this is well compensated for by crisp brass and decent perspective. On ASD 3497, this is a satisfying rendition. In extremely good taste, however, and certainly not for the hi-fi show-off, is the most naturally convincing recording so far of Nielsen's *Symphony No. 5*. From a musical force that we have already found to provide fine sounds with fine interpretations, the Scottish National Orchestra conducted by Sir Alexander Gibson is accompanied by Pamella Dow playing the aggressive side drum which is unscored "as if at all costs it were to stop the progress of the orchestra" and Keith Pearson plays the appealing clarinet. After the battle towards the end of the first movement, the side drum really does march off in disgrace, both musically and positionally. Coupled to the Helios Overture on RCA RL 25148 this is the sort of record that having once been lowered, the tone-arm is difficult to switch off.

With regard to this last sentiment, the same can be said of the Enigma recording of Palestrina vocal works performed by the Pro Cantione Antiqua on K53560. Although musically only of specialist interest, there is an appeal which lives through the centuries and can even exist as a home entertainment media if the engineering allows. It was recorded by Tony Faulk-

ner and so impressed was I with what I heard that I called him to ask the recording location. Knowing him to be a purist, it was obviously with slight embarrassment that he felt it necessary to confess that whilst the artists were recorded with a simple crossed pair of microphones, such was the dryness of the acoustic, some reverberation had to be added later. This, I would rush to point out, was not strictly "artificial" since it was achieved by playing back the tape in another lively church and a modicum of this information blended in. Given the confines of two speaker stereo, it is difficult to detect and certainly in no way impaired by enjoyment of this outstanding disc. Moving forward in time a mere hundred plus years, another specialist recording lies in the CBS Master Works series directed by Jean-Claude Malgoire on 76717. I have had occasion in the past to recommend this man's work with original instruments and his latest offering is of Vivaldi's *The Four Seasons*. I must admit to finding it strange, even strained, when compared to conventional contemporary performances. It is impossible to vouch for the authenticity of the recorded sound under these circumstances, but it is certainly clean and resonant. The final disc I would like to mention in this section of odysseys is by Mozart (no less) and is a recording of his *Adagio in C and Rondo for glass harmonica, flute, oboe, viola and cello*. The *Quartet in F, K 370* and the *Quintet in C, K 406* make up the balance of this record, Philips 9500 397. The "glass harmonica" consists of bowls tuned with varying amounts of water, sounded with moistened fingertips run round the edge of the glass. The origin of the instrument can be dated back as far as the 14th century, although some modern composers have employed similar ideas. Again the authenticity of sound of this particular instrument cannot be confirmed, but the overall balance of the recording is rather close for the lushness of the other famous works, but nevertheless this must rank as one of the most intriguing records mentioned.

Continuing their successful series of Haydn Symphonies with Colin Davis conducting *The Concertgebouw Orchestra* (Amsterdam), Philips has recently released the popular *Drum Roll No. 103*, coupled to *Symphony No. 87 in A*, on 9500 303. As related before, these recordings are technically difficult to fault, with a tasteful balance between closeness and ambience, although perhaps minutely strident in places. As would be expected, this light music is performed with a deeper understanding of its underlying great-

ness. In similar vein, in the sense that such music can be used when required as merely for background, Philips have also just issued a second record of Rossini Overtures (including the famous *William Tell*) played by the St. Martin-in-the-Fields Academy conducted by Neville Marriner on 9500 349. The first record was issued some years ago (6500 878) when I made enthusiastic remarks concerning the presentation. It needs, however, to be played at a rather higher than usual level to obtain the best illusion, and while being more contrived than many records on this label, it is extremely similar to their earlier release. Both can be thoroughly recommended.

I am always complaining that I find it difficult to obtain decent opera records. I am also generally not enamoured with the sounds produced by CBS. An exception to these observations lies in a Master Works series three-disc box set of Cilea's *Adriana Lecouvreur* on CBS 79310. I do not feel qualified to comment on the performance, but my music critic friends think it a rave. Although it still contains some of the characteristic colorations associated with this label and is obviously of the contrived type of recording, it contains exceptionally good dynamic and frequency range and crispness, convincing distance effects with satisfactory vocal-to-orchestral balance.

The Kings' Singers have reached their tenth year and to celebrate held a Tenth Anniversary Concert in the Royal Festival Hall. EMI has issued two separate records of the live performance, the first being mainly classical and the second mainly popular (KS 1001 and KS 1002 respectively). Many of the items are contained in their studio recordings such as the *Concert Collection* on CSD 3766 and *Lollipop*s on EMC 3093 which are better recorded but do not have the infectious enthusiasm which only the presence of an audience can bring. In fact, there is some very slight blurring in places but this can easily be forgiven for the sake of the enjoyment provided. If you are not interested in the whole concert, at least give an ear to the second part and tell me you are not amused! The novelty songs, in particular, bear repeated playings and are marvellous for playing to visiting relatives, etc. The melody of *Greensleeves*, in particular, with wording revolving around Green Shield Stamps (Green Stamps in the USA I believe) always causes a laugh, and I am surprised that this has not been issued as a single. It certainly deserves to get onto the charts. Ideal Christmas fare!

# SPEAKER INFORMATION KIT.



Get 70 pages of speaker facts in three fact-packed publications.

Speakerlab's Speaker Operating Manual covers everything you need to know to get the best performance out of any loudspeaker, including placement, wire gauges and allowable lengths, amp overloads, room acoustics, L-pad adjustments and impedances.

Our 54-page color catalog covers enclosures, designing your own speakers and driver principles as well as our line of nine easy-to-build speaker kits ranging from a miniature two-way system only ten inches high to a massive all-horn corner system.

"How To Hook Up Your System" spends twelve pages of text and diagrams really explaining system hookup. From where to place your electronics for maximum cooling to the intricacies of installing a cartridge, from eliminating hum to proper record care.

Get all three from the folks who take speaker information seriously.



For free, I can really use 70 pages of speaker information from the world's largest manufacturer of speaker kits. AD-T

name \_\_\_\_\_

address \_\_\_\_\_

city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_

### PRICE BUSTERS

#### SPEAKER ENCLOSURES

Mfg. close-out - Famous Name Mfg. had model change & close-out of production run. They might have slight blemishes, or 2nds, on the finish. Only we saved big for you. (Sample picture shown) - most are ducked port 3 & 4 way with pop off grills & tweeters, midrange controls on front.

**SAVE!**

8" .35wt .3way DP . L.P.	\$198.00	Cost \$118.88
10" .50wt .3way DP . L.P.	\$279.50	Cost \$179.88
12" .70wt .3way DP . L.P.	\$349.50	Cost \$199.88
12" .90wt .4way .12" P.R. L.P.	\$399.50	Cost \$248.88

---

#### RACK CABINET EQUIPTO

Size 24" X 68" with rails on front & back for mounting equipment on 19" centers. No doors or sides - List Price \$185.00!

**NEW SURPLUS MERCHANDISE - Your cost only \$50.00 each. Qty. ltd. Frt Collect.**

8)B2049 ..... **\$50.00**

---

#### MOTION DETECTOR

#### PROTECT YOUR VALUABLES

This alarm sensor fills the protected area with an energy screen that cannot be seen, felt or heard. Triggers your alarm whenever burglar moves through detector field. Mounts on ceiling, wall, desk, shelf, etc. Optional delay mode, auto-reset. Operates on 12.5 VDC. A Closeout!

Qty. ltd. Sh. Wt 3 Lbs.  
8D30336 ..... **\$49.88**

---

#### MOTOROLA® PIEZO-ELECTRIC TWEETERS

*3" Horn . . . \$7.88 . . . \$14.88/Pr.
*2X5" Horn Tweeter . . . \$17.88/Pr.
*2X6" Super Horn . . . \$23.88/Pr.

---

\*NOW 2 LOCATIONS\* VISIT OUR NEWEST RETAIL STORE THE TOWNE DUMPE, INC. NEXT TO WOOLCO 777 S. WILLOW STREET MANCHESTER, N.H.

SEND ORDERS TO: B&F ENTERPRISES DEPT. A-12 119R Foster Street Peabody, Mass. (617)531-5774 01960

Send for our FREE 64-pg. catalogue Please add POSTAGE. No C.O.D.'s

# The Audio Critic reports a small breakthrough.



Since there exists a great deal more mediocrity than excellence in high-end audio, the test reports in *The Audio Critic* are more often on the negative than on the positive side and very rarely enthusiastic. That's why the latest issue (Volume 1, Number 6) is special; it hails quite a few impressive new advancements in equipment design.

Specifically we review new developments in speakers, amplifiers, phono systems and peripheral equipment, the sum total of which is greater clarity and definition in sound reproduction than has been obtainable until now, at any price. In combination, these new components constitute a minor breakthrough in audio performance, well short of a revolution but quite audible nonetheless. In this same issue we also summarize and update our previous reviews for the benefit of new subscribers.

As most of you must have heard by now, *The Audio Critic* is the purist's audio review, containing no advertising by either manufacturers or dealers and dedicated to in-depth testing both in the laboratory and in the listening room. Our laboratory is a superbly equipped in-house facility (we don't hire commercial labs to do our testing), and our listening criteria are merciless.

The subscription cost of six consecutive issues (indexed as one volume) is \$30, by first-class mail only. (No Canadian dollars, please!) For overseas airmail, add \$6. No single copies are sold for any reason whatsoever, but the unused portion of canceled subscriptions is refundable on request.

You'll probably want to start with the new reference issue (Volume 1, Number 6); however, you may also be interested in the still current Volume 1, Numbers 4 and 5, which cover certain subjects in greater detail (such as our widely discussed cartridge/arm alignment instructions). Of course, you'll get six consecutive issues no matter which one you start with. Just specify your choice when you subscribe.

Send \$30 for your first six issues today to *The Audio Critic*, Box 392, Bronxville, New York 10708.

# European letter

Donald Aldous



The hi-fi trade — looking at it from the European standpoint anyway — has been in the doldrums for quite a while, but if the support given to several recent British and European hi-fi exhibitions is any yardstick, then business is again on the upturn.

One of the most successful British audio shows is the Harrogate International Festival of Sound, which closed a four-day run recently. This year's event was spread over an exhibition hall and a number of nearby hotels and another variation was having the first two days public, with the closing two for the trade only. This plan seemed to work, although leaflets were consumed rapidly, and most exhibitors were tired by the time the trade visitors arrived.

Let's look at the novelties of this show: One daring innovation was an opening concert by the Black Dyke Mills Band, one of England's leading brass bands. The sound level was very high. In fact, as reproduced sound, it would have been unpleasant listening close up on the peaks, but the clean, undistorted sound merely confirmed

that we still have no hi-fi system capable of reproducing orchestral music with "live" realism. Them's fighting words I know, but having heard symphony concerts in our famous concert halls, I know that despite all the vast array of equipment on demonstration (particularly varieties of loudspeakers), we have a long way to go yet. Maybe that's a good thing for manufacturers and journalists!

One event that attracted dealers and press alike on Monday evening was a lecture by Roy Allison, President of Allison Acoustics; his main theme was to demonstrate the importance of positioning loudspeaker enclosures within the room confines. He showed how locating the enclosure at varying distances from the two walls forming a corner, and varying heights from the floor, significantly changes the audio output response and power at the lower frequencies.

JVC products are well known all round the world, but we were intrigued to learn the company is now offering their MCI pickup cartridge. This is an elegant design using the

moving-coil principle and will cost about \$300.00 in the U.S. This is a design of extreme sophistication with printed-circuit moving coil measuring only 1 mm square.

Undoubtedly a trend is showing itself towards reduction in physical size of amplifiers, radio tuners, and receivers. Matsushita already has a range of equipment intended for shelf-stacking alongside books. Toshiba also promises a bookshelf hi-fi system by the end of the year. Incidentally, to get a foothold in the UK, Toshiba has joined forces with Rank International, the Plymouth-based TV manufacturing company.

Another micro system is the Aurex, which includes a power amplifier, preamplifier, and tuner measuring only 9 by 12 by 7 in. when stacked together. Output power is not sacrificed but using micro-circuits enables the Aurex system to deliver 50 watts per stereo channel. The tuner reads out the station wave length digitally like a calculator display. A micro-cassette is also in the pipeline, and the micro loudspeaker's dimensions are 4.75 by 4.75 by 7.5 in.

Disturbing as it may be to Japanese and American hi-fi manufacturers at Harrogate the "musical" sounds were being made by the smaller British firms, such as Castle Acoustics, B & W, Monitor Audio, Chartwell, Lentek, Celestion, and Richard Allan, all producing admirable loudspeakers for domestic use. KEF and Quad (Acoustical Manufacturing Co.) were not taking part, but will participate in the High Fidelity 78 Autumn Hi-Fi Show at the Cunard Hotel, London. As I write these notes, there is a month to go before this exhibition opens, so I will report it later.

Goodmans has introduced an impressive new range of three loudspeakers employing newly developed or improved versions of drive units with a finish in a soft brown leather-look material with matching African hardwood nosings. The systems are known as the Sigma, which is the largest, a floor-standing design. It is a two-way system, plus passive radiator, with a 205-mm long-throw bass unit with pleated surround, a high-power voice coil and rigid polymer cone matched via a 12-element network, plus the well-proven 25-mm soft-dome HF unit. The passive radiator augments the bass response down to 35 Hz. The Sigma is rated for amplifiers between 20 to 95 watts rms. The Kappa uses the same two drive units, but with a passive radiator. The "baby" of the group is the Beta in a

AUDIO • December 1978

# SEEK AND YE SHALL FIND!

If you're one of those people that want facts instead of fluff then Fidelity Research is your kind of company. You see we're one of those old fashioned companies that would rather spend it's money on research and development than slick, glossy ads. So, we've developed some fact sheets on our moving coil cartridges, tonearms and related equipment. If you're serious about the optimum tonearm/cartridge combination then give us a call toll-free. We'll send you the facts. Nothing more. Nothing less.



## 1-(800) 821-2280 (ext. 110)

Mo. residents 1-(800) 892-5890 ext. 110

Fidelity Research/America Fidelity Research/Canada  
 P.O. Box 5242, Ventura Ro-Bar Electronics, 134 Doncaster #7  
 Calif. 93003 (805) 642-9277 Thornhill, Ontario L3T-1L3 (416)881-2331

Enter No. 23 on Reader Service Card

## Coming in January

# Special in-depth review of ADC arm/cartridge

## NEW 2ch/4ch DOLBY® KIT

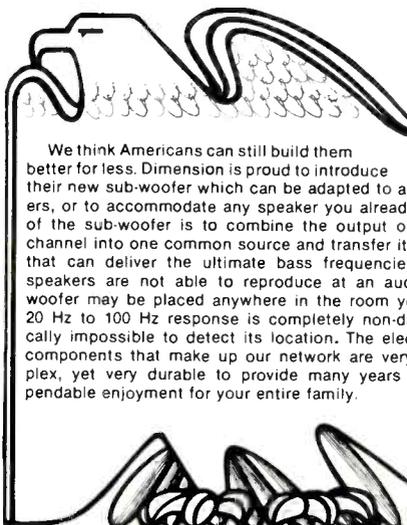


Enjoy your tapes and Dolby® FM broadcasts more with this versatile, low cost noise reduction kit. Latest design ICs, self powered, independent (just plug in tuner and recorder), complete with solid mahogany cabinet. No instruments required.

2 channel encode or decode \$99.50 plus \$3 shipping. 4 channel internal adapter \$35 also enables simultaneous decode/encode. Order both for \$125 and we pay shipping. Pa. residents add 6% sales tax. \*Trademark of Dolby Laboratories, Inc.

INTEGREX, INC. P.O. BOX 747, HAVERTOWN, PA. 19083

Enter No. 27 on Reader Service Card



## DIMENSION

MINI LAB SERIES NEW SUB-WOOFER MKI • MKXII

We think Americans can still build them better for less. Dimension is proud to introduce their new sub-woofer which can be adapted to any of our mini speakers, or to accommodate any speaker you already have. The principle of the sub-woofer is to combine the output of your left and right channel into one common source and transfer it into a 12" enclosure that can deliver the ultimate bass frequencies that most smaller speakers are not able to reproduce at an audible level. The sub-woofer may be placed anywhere in the room you would like for its 20 Hz to 100 Hz response is completely non-directional and practically impossible to detect its location. The electronic components that make up our network are very complex, yet very durable to provide many years of dependable enjoyment for your entire family.



Custom Craft

819 S. Kraemer Blvd. / Placentia, CA 92670 / (714) 630-5440  
 REP. AND DEALER INQUIRIES WELCOME

Enter No. 17 on Reader Service Card

The  
"Real-Time  
Array"

is  
coming

Bound volumes for '77  
still available: \$23.00 each

Write to:  
Jean Davis  
c/o Audio

401 North Broad Street, Philadelphia, PA 19108

144

cabinet of 10.4 litres internal volume and thus suitable for shelf mounting. A two-way system with 165-mm long-throw bass driver and 25-mm dome HF unit, this Beta model will suit amplifiers rated between 18 to 70 watts rms. Goodmans also have some high efficiency models — the HE-1, a three-way, four-unit reflex system and the JE-2, a three-way, three-unit reflex system. These designs have high power handling capability and very high sensitivity.

Still dealing with loudspeakers, as observed at Dusseldorf, the Dutch Audiostatic Electronics' speaker attracted a lot of interest. This is a clean-looking ELS of the folding screen type, measuring 51 in. high. The walls of the demo room were lined with brown hopsack, and frequency response curves and other data were displayed on the studio walls.

Backes and Muller had a well-planned half-hour demonstration at Dusseldorf. This company now has three feedback control loudspeakers: BM7 (two-way system), BM6 (three-way system) with electronic feedback over all three drivers and BM8. The BM8 is an omni-directional, six-sided construction with drive units located on five sides. There are 15 bass drivers (three per side) with metal diaphragms and inductive pickup devices for feedback regulation. Five additional cone units, also with metal diaphragms, deal with the bass/midrange. Five dome speakers with capacitance feedback coupling handle the middle/high frequency range, with five capacitively coupled ribbon units (mounted horizontally) for the extreme high frequencies. The system has 14 power amplifiers, with electronically coupled feedback, driving the ensemble. The speaker is 1.1 metre high and 50 cm. in diameter, and the price is 2,700 DM. The BM9 is a preamplifier suitable for driving the active loudspeakers.

Several critical observers of the hi-fi scene were greatly impressed with the ESS Transar loudspeaker (from Oskar Heil) particularly with an exceptional clarity of detail in its reproduction. Another unusual design at Dusseldorf was the single-unit device housed in a flying saucer-shaped housing some 680 mm diameter and 300 mm thick at its widest point. Stand options are available, as well as suspension systems for ceiling mounting. Sound reproduction was remarkably clear and stereo image well defined. Price, 2,600 DM each. This design is due to Joseph Manger, who has received a cash injection from the German government to initiate production. **A**

AUDIO • December 1978

**ADVANCED  
Electronic Music  
Products**.... effects devices to  
computer controlled modular synthe-  
sizers. Select from experimenter's  
kits, step-by-step product kits or fully  
assembled professional equipment.



FREE  
color catalog

**EA** ELECTRONICS, INC.  
1020 W. Wilshire Blvd. Oklahoma City, OK 73116

SEND FREE CATALOG TO:

name \_\_\_\_\_

address \_\_\_\_\_

city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_

**EA** ELECTRONICS, DEPT. A

1020 W. WILSHIRE BLVD., OKLAHOMA CITY, OK 73116

Enter No. 42 on Reader Service Card

**Top Discount AUDIO**

*Your* **NATIONAL HEADQUARTERS**  
For Famous Brand Electronics By Mail

1150 N. Powis Rd., West Chicago, Ill. 60185 • (312) 293-1825  
All Orders Shipped In Factory-Sealed Cartons  
Write Or Call For The Lowest Prices Anywhere!

**MILLION \$\$\$ INVENTORY**

**LOWEST PRICES ON**

RECEIVERS	TURNTABLES	TUNERS
SPEAKERS	CHANGERS	CARTRIDGES
TAPE DECKS	AMPLIFIERS	HEADPHONES
CALCULATORS	COMPACTS	CAR AUDIO

Top Discount Audio, 1150 N. Powis Rd., West Chicago, Ill. 60185 (312) 293-1825

We honor Master Charge and Bank Americard. Date \_\_\_\_\_ AU12

Please send me a quote on: \_\_\_\_\_

MR  MS (First) (Initial) (Last)

(Number And Street) \_\_\_\_\_

(City) \_\_\_\_\_ (State) \_\_\_\_\_ (Zip Code) \_\_\_\_\_

Enter No. 47 on Reader Service Card

# Classified

## CLASSIFIED ADVERTISING RATES

**BUSINESS ADS-** For Sale. Help Wanted. Services. Business Opportunities. Tape Recordings, etc. etc. \$4.80 per line. First line set in bold face type at no extra charge. Extra lines \$9.60 per line. One point ruled box, extra charge \$8.00. Full payment must accompany order.

**NON BUSINESS ADS-** Situations Wanted, used equipment for sale by private individuals \$2.80 per line. First line set in bold face type at no extra charge. Extra lines set in bold face type \$5.60 per line. Full payment must accompany order.

**FREQUENCY DISCOUNT-** 3 times, less 10%. 6 times, less 15%. 12 times, less 20%. (line copy ads only)

**DEADLINE-** 1st of two preceding months. (Dec. 1 for Feb. issue.)

**BLIND ADS-** Box numbers may be used at \$5.00 extra for handling and postage.

### MAIL ORDER AND DISPLAY CLASSIFIED RATE

1 col x 1"	\$125
1 col x 2"	\$180
1 col x 3"	\$250
2 col x 1"	\$180
2 col x 2"	\$320

Advertiser must supply complete film negative ready for printing for display ads.

AUDIO Magazine  
401 North Broad Street  
Philadelphia, Penna 19108

### HOW TO ANSWER BOX NUMBER ADS

When replying to an Audio Box Number Ad, please use this address Box No. — c/o Audio, 401 No. Broad Street, Philadelphia, Pa. 19108

## FOR SALE

## THE SENSIBLE SOUND

**IN OUR NEW ISSUE—#5, WE REVIEW**

Hafler DH101, GAS Thalia, DB-1A, Kenwood L-07C, Ace 3000, PS Audio II, Audionics BT-2, Chartwell LS3/5A, Fried B/2, JR-149, Shure V15-IV, Signet TK7E, Sonus Blue (new), Grado F1 +, ADC ZLM, Micro-Acoustics MS-1, Audioplate, Speakerlab 3, Crown LC-150A, PSE Studio One, A.I. CM300, Speakerkit 4&5, Advance A, Cizek II, Technics SB5000A, Avid 101, Grafyx 7, AR 15 & 17, Visonic 502, Braun Output C, White Half Shot, VMPS 404b, Polk Cable, Warp Knot, Gerrard Recovery Module, Bose 901 III & 601, Monitor Audio MA3-II, Plus some zero cost tips, inside industry info, and dozens of "Audiophile" record reviews. **SUBSCRIBE TODAY.** \$12 (4 issues), \$13 Canada, \$14 First Class Mail, \$17 foreign.

403 DARWIN DRIVE, SNYDER, NY 14226

## AUDIONICS of OREGON PRESENTS

### THE BA-150 STEREO POWER AMPLIFIER

The AUDIONICS BA-150 is an unique power amplifier using vacuum tube output stages whose bias and operating voltage is controlled by an internal digital computer. This extends tube life to over 30,000 hrs without any manual adjustments. The front end of the BA-150 is of solid state class A design. The amount of negative feedback is selected on the front panel. The BA-150 is rated at 150 watts into 4, 8, or 16 ohms with peak capability of 200 watts/chan. Audition the AUDIONICS BA-150 and other fine products by AUDIONICS of OREGON exclusively in New York at

**AMERICAN AUDIOPHILE**  
5 SUNRISE PLAZA  
VALLEY STREAM, N.Y. 11581  
FOR APPT: 516/561-7114

**AUDIO PROFESSIONALS:** Find out why the AUDIO FORUM is the only audiophile-oriented publication that has earned the respect of the entire industry. Our unique format offers you direct access to the people you want to reach! Write today for details. Don't wait! Box 578-A, Fairfax, CA 94930. 1-9

## FOR SALE

**AWARD WINNING SONY XL-55 MOVING COIL CARTRIDGE** This one is a sleeper. Hear the pure sound of coreless coil uncontaminated with iron hysteresis. \$175.00 incl. post. and ins. Also, SONY HA-55 super performance pre-pre-amp. \$275.00. Send money order or specify Visa or Master Charge Number and Expiry to Western Sound — 619 Erin Street, Winnipeg, Canada, R3G 2W1. one of the largest hi-fi specialists in North America. 1-9

**BACK ISSUE MAGAZINES.** Over 200 titles. 1890 to 1978. Send stamped Envelope. Free List. Everybody's Bookshop, Dept. AU, 317 West 6th, Los Angeles, Calif. 90014. TF

**BEST BUYS!** Threshold amp. (audio Feb. 1977) \$200 = shipping Audire amp. (model 2); Audire pre-amp, \$300 each. Black-widow Tonearm — \$125. Winlabs SDT-10 type II-p (new) \$150 .. Infinity Servo — statik subwoofer — \$300. S.A.S.E. Bill Mekeel 6838 N. Herndon Pl. Stockton, Calif. 95209; (209) 957-4722. 12-8

**WIN LABS IN STOCK!! AUDIO DIRECTIONS,** 8898 Clairemont Mesa Blvd., San Diego, CA 92123. (714) 278-3310. Telephone orders accepted.

**Big #12/Gauge Speaker Wire** cut to any length. .40 cents per foot. Free shipping for 100 ft. or more. UPS COD orders OK. Audio House 5232 S Sagamore Creek Mich. 48473 TF

## The HAFLER DH-101 Preamplifier



*The Pre-Amp with the Rave Reviews!*

Write for free literature and test reports  
The David Hafler Co., 5817 Roosevelt Ave., Pennsauken, N.J. 08109

# Audio Excellence

A UNIQUE STEREO SHOWROOM DEDICATED TO THE PERFECTIONIST

Presenting Components from the Prestigious Companies of

**THRESHOLD GAS SNELL ACÓUST CIZEK  
BEVERIDGE LUX VAN ALSTINE ROGERS  
PARAGON DCM FULTON CART. EPA 100  
BRYSTON GALE GRADO SIG. HARBETH**

AT LAST, AN AUDIO SALON IN NORTHERN CALIF. ADVANCING THE ART IN THE ATMOSPHERE OF OUR ELEGANT SOUNDROOMS!  
584 Washington Street, San Francisco 94111 415-433-1335

### "BONGIORNO IS BACK"

After more than 1 1/2 yrs of absence we are proud to announce the new Sumo Amplifier. It is different in every way and consistent with the advancements of designs by James Bongiorno.

In the past, Mr. Bongiorno has designed the Dynaco 400, the entire line of S.A.E. amps, and more recently the products from G.A.S. These were and still are great products. But time moves on and new progress and new ideas must be born.

The new Sumo amplifier will be at your dealer soon along with the Sumo preamp. They will also have features that are new and original, but at prices that can be afforded, in the Bongiorno tradition.

- The Sumo cartridge
- The Sumo Bridge
- The Very Clever Little Crossover
- The Sumo Preamp
- The Sumo Amplifier

See Them Soon  
SUMO ELECTRIC CO. LTD.  
1230 N. Horn Ave.  
W. Hollywood, CA 90069  
(213) 659-4370

**RAPPAPORT AMP-1 REAL TIME POWER AMPLIFIER** now may be heard, with the newly improved **SNELL TYPE A** speaker at our studio. A marvelous listening experience awaits you! Phone for appointment.

**AUDIOWORKS**  
Box 4314, Harrisburg, PA 17111  
Tel. (717) 652-6996

### TURNTABLES

- Denon • Visonic • Supex • Linn Sondek
- Transcriber • SAEC • Grace • Sleeping Beauty
- AKG • Formula 4 • Dynavector • Mitsubishi

**Audiocom** HIGH TECHNOLOGY AUDIO  
177 Sound Beach Ave Old Greenwich CT  
Phone (203) 637-3621

## FOR SALE

### ATTENTION SOUTHERN AUDIOPHILES

Yamaha	Crown
Dahlquist	Polk
Audio	Denon
Bang & Olufson	Klipsch
Advent	Technics
M & K	Visionik
Aiwa	Sonus
Philips	Maxwell

Available at Sound Advice

Village Plaza Ruston LA. 71270 (318) 255-8000. 9-9

### "ATTENTION SUPER AUDIOPHILES"

SUMO ELECTRIC CO. LTD. AND A-TRAIN LTD. PROUDLY ANNOUNCE THE AVAILABILITY OF THE SUMO CARTRIDGE. AFTER YEARS OF RESEARCH A NEW MAGNETIC CARTRIDGE HAS ARRIVED TO CHALLENGE THE MOVING COILS. WITH ALL OF THE GREAT FEATURES OF THE BEST MOVING COILS SUCH AS LOW MASS, LOW COMPLIANCE, AND EXTREMELY LOW TIP MASS. THE SUMO CARTRIDGE IS FINALLY HERE AT A PRICE THAT CAN BE AFFORDED—\$150—AT YOUR DEALER NOW.

THIS IS ANOTHER FINE PRODUCT THAT A-TRAIN LTD. IS PROUD TO OFFER ALONG WITH THE MORE THAN SUPER AUDIOPHILE DISCS BY AUDIO LAB AND THREE BLIND MICE. SEND FOR OUR BROCHURES RIGHT AWAY.

A-TRAIN LTD., 1230 N. HORN AVE., W. HOLLYWOOD, CA. 90069. (213) 659-4370 TF

**DON'T BE FOOLISH!!!** We can save you money! We have better prices on Audio/Video equipment. Mobile and home. Write for quotes and special sheets. We have better prices on everything! New England Audio Wholesalers, Box 707, Amherst, Mass. 01002. 12-8

Empire 598 Mark 2 turntable with Pickering XV-15/750E cartridge new. \$350 or best offer call 201-782-7186. 12-8

AUDIO RESEARCH D-150 amp \$1995.00. Fulton Model "J" speakers with cover cubes \$1550.00. Jim (215) 322-6358.

## STEREO COMPONENT Video Tape Equipment

**AKAI • B-I-C • Harman Kardon  
Phase Linear • ALTEC • Kenwood •  
TEAC • Marantz • Sony • Technics •  
Sanyo • JVC • JBL • Pioneer • Dual •  
RCA** Photographic Equipment Too!  
**TO ORDER CALL TOLL FREE  
(800) 421-8537**

# Henny's

**CAMERA • HI-FI • VIDEO**  
516 W. 8th St. Downtown L.A., Ca. 90014 Tel. 488-0341

## HEADPHONE POWER AMP

If you've put more than a few dollars into dynamic headphones, you'll be interested to know that most audio amplifiers and receivers have a resistor divider network driving the headphone jack, not the same low impedance source that drives your speakers. But for good reason: Safety. The power at your speaker terminals is usually enough to fry your headphones. Alas, the price you pay for this safety is fidelity. The frequency response rises across your headphones at about 6dB per octave, which means that the signal at 20kHz may be more than 10 times higher than at 20 Hz with a headphone impedance less than 20 Ohms.

The Columbus HD-1 is a solid state amplifier specifically designed to drive low impedance (less than 200 Ohms) dynamic headphones. The power output is enough to blast your ears but not your headphones, and the output impedance is low for a flat frequency response.

Connects directly to your amplifier speaker terminals. Short circuit proof. Direct coupled output.

**Maximum rms power:** 250 mW into 8.0 Ohms. **Sensitivity:** 250 mW/Volt 400 W Input max. **Bandwidth:** -3dB @ 1 Hz and 200 kHz. **THD:** Less than 0.05%. **DF:** 50 min. **Input Z:** 10k Ohms. **Slew Rate:** 10V/μsec. H3XW5 X D7 inches; 3 pounds, 117 VAC. 5W max

For the hi-fi buff as well as the recording professional. Fidelity from your dynamic headphones. Available direct for a limited time @ \$89.76 plus \$5.83 tax for California residents. Suggested retail price \$128.23. Of course a 10 day money back guarantee. Write to COLUMBUS ELECTRIC CO., P.O. Box 24474, San Jose, CA 95124.



## FOR SALE

# Audiophile's Sound Studio

7521 KENWOOD AVE  
CINCINNATI, OH. 45236  
PHONE 513-984-0355

Handling only the finest in domestic and imported components, from B&O to the incomparable MARK LEVINSON HQD SYSTEM

7459 ELMWOOD AVE.  
MIDDLETON, WI 53562  
PHONE 608-831-5955

A complete selection of "limited edition" records is available. Each store has private listening rooms, also professional sales and service staff. Delivery and set-up can be easily arranged. Send for a FREE copy of our BROCHURE and NEWSLETTER.

ARISTON RD 11's w/Infinity Black Widow Burwen DNF-1201A & TNE-7000. Dahlquist DQ-LPI & DQ-1W's. G.A.S. Son of Ampzilla's & Thoebe w/Goliath, JR-149's, and M&K subwoofers. All "mint". Reasonable! 212-260-5110.

### ARIZONA AUDIOPHILES

Dahlquist, S.A.E., Revox, Rabco, Nakamichi, Yamaha, Crown, Grace, Stax, Tandberg, Sonab, Supex, Gale, Klipsch, Phase Linear, Uher, Burwen, J.B.L., Harmon-Kardon Citation, A.D.S., Spectro Acoustics, Beveridge, Sennheiser, Teac, Thorens, Stanton, Aiwa, Stax, Micro-Seiki, Fidelity-Research, Genesis, Optonica, R.T.R., B&W, Toshiba, DBX, Signet, Mitsubishi and Mitsubishi V.S.S.

### JERRY'S AUDIO EXCHANGE

PHOENIX—334 E. Cambridge Rd. (602) 263-9410  
TEMPE—130 E. University Dr. (602) 968-3491  
TUCSON—5750 E. Broadway. (602) 622-7407  
MAIL ORDER HOT LINE—MR. WOZ (602) 265-7841

TF

Send your ad today  
to:

**Audio Classified**  
401 NORTH BROAD ST.  
PHILA., PA 19108

AT PARAGON OF SOUND: New & Superb Conrad-Johnson tube amp and Bering FT 10 tube transistor preamp; Paragon 12A preamp. subwoofer amp, and now Integrated amp; In Speakers-M2 MOD 3, Rogers LS 3/5A, Snell Acoustic, and Acoustic Concept A19; Mrk and Fundamental Research subwoofers; Armstrong. 624 FNE tuner, Denon, Grace, Super and Dynauctor Products. Also used AFI preamp. Call 301-229-2676 (Bethesda, MD) or write P.O. Box 189 Cabin John, MD 20731 4-9

**SNELL ACOUSTICS TYPE A LOUDSPEAKER** sets a new standard for music reproduction. Hear it with the finest electronics at **AUDIO-WORKS**, Box 4314, Harrisburg, PA 17111 Tel. (717) 652-6996 for appointment and consultation.

## FOR SALE

ARC D51; ARC D75; Electronic Industries (predecessor to ARC) two classics D100 (75 watt/channel) amp. Phase Linear 4000. ARC EC-3 Xover. All mint. Call Fri. Sat. Sun. 5-6 p.m. CST: 612-475-1271.

ATTN: LEACH AMP BUILDERS: news letter & hard to find parts sources. Prebuilt details. TA. BOX 90 RRI, Surry, ME 04684. 12-8

### DAVID HAFLER IS BACK!

The man behind the original Dynakits is back with his own company and a new state-of-the-art preamplifier at a bargain price! Available as a KIT or CUSTOM ASSEMBLED by expertly trained wirers—each performance certified. For further details write or call AUDIOKIT—260 Old Country Road, Hicksville, N.Y. 11801 (516) 822-5749

DAYTON WRIGHT XG8 III Full range electrostatic speakers. Two Stereo systems, almost new. \$2650, each or both systems for \$5000. "Truly Fine Speakers." Toronto, Ontario Canada M4U2L4 (416) 961-9906. 12-8

### DESIGN ACOUSTICS DEMO IN YOUR HOME

NEW YORK • NEW JERSEY  
All Models Available  
Appointment At Your Convenience  
Call your "MUSIC MAN" anytime at:  
212-886-1355 or 516-621-2126

DIAMOND NEEDLES and Stereo Cartridges at Discount prices for Shure, Pickering, Stanton, Empire, Grado and ADC. Send for free catalog. LYLE CARTRIDGES, Dept. A, Box 69, Kensington Station, Brooklyn New York 11218. For fast service call toll free 800-221-0906. TF

WIN LABS SINGS!! AUDIO DIRECTIONS, 8898 Clairemont Mesa Blvd., San Diego, CA 92123. (714) 278-3310. Telephone orders accepted.

### DIGITAL COMPARATORS!!!

DON'T TRY TO BUILD YOUR OWN. IT DOESN'T PAY OR WORK. CROSSPOINT HAS THE EXPERIENCE AND KNOWLEDGE TO DO IT FOR YOU CORRECTLY. HIGH QUALITY AND BEAUTIFULLY MADE. FOR DETAILS, CONTACT:  
CROSSPOINT INSTRUMENTS, INC.  
12 IRVING ST.  
FRAMINGHAM, MA. 01701  
617 872-5418

### DISCO: MOBILE OR FIXED = CASH

START YOUR OWN DISCO BUSINESS. Complete 25 page start-up manual explaining sound and lighting systems installation written by Professional Disco DJ's and Designers. \$10.00 J.C. ENTERPRISES, P.O. Box 243, Apalachin, NY 13732 1-9

### ELECTRONICS

GAS • Nakamichi • Mitsubishi • AGI  
Spectro Acoustics • APT • Audiopulse • ADS  
Burwen • Audionics • Denon • Setton • NAD

**Audiocom** HIGH TECHNOLOGY AUDIO  
177 Sound Beach Ave Old Greenwich CT  
Phone (203) 637-3621

**FOR SALE**

**AUDIO HORIZONS™** is a new and different publication with news and component reviews for the mature, serious audiophile. The first issue is now available. Part of this issue is devoted to in-depth reviews of ten moving coil step-up devices... several of which have never been reviewed in any other audio publication. We think you will find **AUDIO HORIZONS** informative, easy to read, and occasionally controversial. Subscriptions are \$13 for 6 issues \$24 for foreign subscriptions. All issues will be sent First Class Mail.

**AUDIO HORIZONS**

P.O. BOX 10973  
St. Louis, Missouri 63135

**DON'T WASTE MONEY** — Get Audio equipment costs!! We'll send you the manufacturers price list for the equipment you want, plus unbiased recommendations. All for only \$4.95 (+tax where applicable). Audio Shopping Service, Box 707, Amherst Mass. 01002. 12-8

**DO YOU WANT TO BE AN AUDIO INSIDER?** You can be if you read the **AUDIO FORUM**. The only audio information publication devoted to the interests of both the audiophile-music lover and the audio professional. Every one can use the AF. Dealers, Importers and Reps find out about the new products and companies—well before their competitors. Manufacturers and designers use AF to bring their design philosophies and products to the attention of the interested public in an ongoing dialogue. Plus audiophile commentaries, free personal ads and much more. Whether you make a living in audio or just want to be in on the action, subscribe today by sending \$15 (\$18 first class, \$22 overseas air) for six bimonthly issues to: AF, Box 578-A, Fairfax, CA 94930. TF

**ELECTRONIC BARGAINS, CLOSEOUT, SURPLUS!** Parts, equipment, stereo, industrial, educational. Amazing values! Fascinating items unavailable in stores or catalogs anywhere! Unusual FREE catalog. ETCO-008, Box 762, Plattsburgh, NY 12901 TF

**ELECTRONIC CROSSOVERS—ALL TYPES.** Updated definitive booklet describes applications, how to improve speaker systems, \$5.00 postpaid, credited to first purchase. Huntington Electronics, Box 2009A, Huntington, Conn. 06484 TF

**EV Sentry V studio monitors**, accurate sound, \$510 pair. Altec A-7 speaker systems, \$650 pair. Altec BiAmps. Magcord 1028 2-track, \$600. Early Empire turntable. Fred Bruflodt, 228 University Dr., West Lansing, MI 48823 (517) 332-8050 12-8

**FALL-WINTER SALE**

Audio Research SP-4A preamp., \$675; D76A amp., \$725; Tandberg TR2075 Releiver, \$750; 10X tape deck, \$825; KEF 105 speakers, \$980 pr.; GAS theobe preamp., \$395; tin ear, 704 Symons, Richland, WA 99352 (509) 946-4459 2-9

**ACTIVE ELECTRONIC CROSSOVERS**

Plug-in Butterworth (maximally flat) filters in 6 db., 12 db., or 18 db. per octave attenuation, any specified frequency. Complete crossover in attractive cabinet with all terminations and regulated power supply.

MONAURAL BI-AMP	\$ 92.00
STEREO BI-AMP	\$126.00
STEREO TRI-AMP	\$209.00
STEREO QUAD-AMP	\$279.50

Suggested added features: Summer for "Single Woofer" systems, sub-sonic noise elimination filters; level controls.

**FOR OEM'S AND HOME ASSEMBLERS**  
500 Series dual filters and/or plug-in filters; regulated power supplies.

**WRITE FOR FREE BROCHURE AND PRICE SHEET**

**DeCoursey ENGINEERING LABORATORY**  
11828 Jefferson Bl. • Culver City, CA 90230  
Phone: (213) 397-9668

**FOR SALE**

**Enjoy Better Music!!** Detail analysis of acoustic performance of your room. Report shows how to improve sound quality. Send room and furniture description (measurement and material) with \$10 to Glotech Box 714-A.

**ESOTERIC RECORDS**

Direct-to-disc, super-disc and Film Music. Comprehensive, free catalog will astound and amaze! Cosmic Chords P.O. Box 4873 Boulder, Colo. 80302 3-9

**FUTTERMAN HANDCRAFTED** tube amplifiers. Golden Ear Reference loudspeaker system. Levinson JC-2 preamp, new \$1,250.00, another in pristine hardly used \$1,175.00. Hadley #622 amplifier \$300.00. Advent #300 Receiver, new \$250.00. McIntosh MC-2300 Amplifier, pristine \$1,135.00. Marantz 10B tuner, mint \$800.00. McIntosh MR67 Tuner, pristine w/extra tubes \$375.00. Quad #303 amplifier, mint \$225.00. DBX #122 Noise reducer, new \$259.00. Magneplanar 1D Speaker System, new \$1,265.00. Magneplanar III-A speakers, mint \$1,350.00.

WANTED: Audio Research D-150's; Marantz 5's, 70's, 8B's, 9's; McIntosh 275's, C-22's, MC-3500's; M & K Rabco tonearm. GOLDEN EAR, Box 2189, Riverview, Michigan 48192. (313) 479-1234.

**FOR SALE**

**FLINT MICHIGAN**

The Best Value in Audio

Rogers BBC, the New Rogers Reference Monitor System XA75/L35B, \$1999. db systems, Conrad-Johnson, Leach, Bryston, Visonik, Grace, Watson Labs, M&K cubes, Spectro-Acoustics, Supex, Mordaunt-Short, Connoisseur, Sound Concepts. "Audio House feels the quality of sound you receive for your money is more important than how much you spend."

AUDIO HOUSE 5232 Sagamore Dr., Swartz Creek Michigan 48473 (313) 732-4670 TF

**FORMULA 4** Universal Alignment Protractor, enables correct setting up of all tone arm assemblies and measuring tracking accuracy over entire disc surface. Original Hi Fi News review \$1. Protractor \$5 Bills only. Mayware Ltd. 15 Heather Walk, Edgware, Middlesex England. 12-8

**FORMULA 4** tone arm \$70, A.R.C. D100A \$800, B & W — PM7 \$750 pair, Nakamichi 550 \$400. 1-9

**Bob Heenan Sells Great Used Equipment**

Tel: 617-734-2727  
Sound Advice  
Box 782  
Brookline Village  
MA 02147

AR	Marantz (Tubes)	SAE
DB	Magneplanar	Sony
EPI	McIntosh	Stax
Bose	Levinson	Quad
B & W	LS 3/5A	Revox
Crown	H - K	Yamaha
Advent	Linn	Thorens
Dahlgquist	GAS	Tandberg
Dyna (Tubes)	JBL	Nakamichi
Audio Research	Lux	Phase Linear

**Money Back Guarantee**

**Sound Advice, Box 782,  
Brookline Village, MA 02147**  
Equipment bought, sold, traded & brokered.

**lower**



the response of your speaker system with the JR Super Woofer and LPA unit—our little brown box that segregates and amplifies the low frequencies. By the way, our LPA (Low Pass Amplified) unit can be used with other sub-woofers, too.



H & H International, 354 State St., Rochester, N.Y. 14608 • 716/325-5275

## FOR SALE

### MILWAUKEE & WISCONSIN'S ONLY TRUE AUDIOPHILE DEALER

Specialists in components by Audio Research, Dahlquist, Transcriptors, SAE, Nakamichi, Bozak, MSE, DBX, Revox, Infinity, RTR, Phase-Linear, Tandberg, G.A.S., London-Decca, Stax, Sonus and over 50 others. Wisconsin's ONLY Audio Research dealer with their new product line on demonstration. Plus one of the truly largest displays of tape decks & accessories in the entire country. Over 130 machines on display. WACK ELECTRONICS, INC. 5722 W. NORTH AVE. MILWAUKEE, WI 53208 TF

**MIXER** made especially for tape duplication. Will produce enhanced high quality second generation tapes. KUHN ELECTRONICS, 1801 Mills Ave., Norwood, OH 45212. TF

**M Leach Wide Bandwidth Preamplifier** preassembled and tested circuit boards. RIAA Board \$35, Output Board \$25, Center Channel Board \$15, IC Regulated Supply with transformer \$35, plus \$2 shipping. Custom Components, P.O. Box 33193, Decatur, GA 30033. 12-8

### MONTANA AUDIOPHILES DISCOVER ROCKY MOUNTAIN HI FI

DAHLQUIST	NAKAMICHI	SONUS
ACOUSTAT	GAS / AMPZILLA	GRACE
BEVERIDGE	AUDIONICS	VERION
DCM TIME WINDOW	HEGEMAN	STAX
FULTON/FMI	SONY	POLK

812 Central Ave., Great Falls, Montana 59401  
Phone (406) 761-8683

Northern N.J.'s finest store—Lux, Mod DQ-10, IMF, Grace, B&W, G.A.S. Sleeping Beauty, FR, B&O, Linn Sondek, Janis and more. University Stereo, 57 E. Ridgewood Ave., Ridgewood, N.J. 07450. 20 minutes from the G.W. bridge. 201-447-5700. TF

**NOTES ON THE K-A LABYRINTH:** Audiophiles, become enlightened! Why clutter up your listening room with bulky sub-woofers, mid and tweeter arrays, and a pile of electronic components? . . . when one pair of K-A LABYRINTHS will do the job. Less than \$1500 pair. For information and dealer list write or call: KUSTOM ACOUSTICS, INC., 6624 W. Irving Park Road, Chicago, IL 60634 (312) 685-6609. TF

## SPEAKER INFORMATION KIT

Get 70 pages of speaker facts, specs, construction tips plus info on our raw speakers, crossovers and a line of 9 quality hi-fi speaker system kits. We'll send you our **full-color catalog**; plus **How to Hook Up Your System**, an exhaustive step-by-step treatise on hi-fi system installation, and our **Speaker Operating Manual**, chock full of facts on how to get the most from any speaker system, for Free. Even if you don't buy from us we want you to have the facts. That's how we got to be the world's largest manufacturer of speaker kits. Send to: **Speakerlab**, Dept. AD-S 735 N. Northlake Seattle, WA 98103

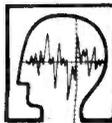


**Now in Fort Lauderdale...**  
**State of the art components for the audio perfectionist and serious listener.**

Audio Research • Acoustat • Denon • B & W • Armstrong • Chartwell • Lux  
Tangent • Polk • GAS • Conrad Johnson • Audire • Ariston • Connoisseur  
ADC • Grace • Supex • Grado • Goldring • DB Systems • Quatre • Stax  
Sonex • Plasmatronics • Transcriptors • Dynavector  
*Complete selection of direct to disc recordings.*

**AUDIO INSIGHT**  
The Promenade at Bay Colony

6286 N. Federal Hwy., Ft. Lauderdale, FL 33308 • 305/491-7677



## FOR SALE



the weakest link . . . in your sound system is probably the record itself. **HIGH DEFINITION RECORDINGS** offers the most complete mail order service of direct-to-disk recordings. We carry Sheffield, Crystal Clear, Umbrella, East Wind, G.A.G., Nautilus, and others. We also stock French EMI, Fresh Aire, Gale, Denon PCM, Crescent, Audio Labs, Three Blind Mice, assorted European pressings and more! Send for our free catalogue.

**high definition recordings**

P.O. Box 82566  
San Diego, CA 92138

### NEW

#### AUDIO MODIFICATION MANUAL

Everything you need to know to modify your equipment. Use it to its best advantage, and let it help you select components for your system. More than 220 pages of valuable information, with emphasis on vacuum tube circuitry. Step-by-step procedures for many common components. Strongly recommended by experts for both the amateur kitbuilder and the advanced audiophile. Proprietary modifications presented in detail. This unique book provides information available nowhere else. Purchase includes one year's free consultation service. \$25 U.S.A., \$27 other countries. California residents add \$1.50 tax. Telephone orders accepted (M/C, Visa): (714) 278-3310. AUDIO DIMENSIONS, 8898 Clairemont Mesa Blvd. San Diego, Calif. 92123.

**NEW QLS-1 DISCOUNT 20-25%** (803) 781-4638 6-8 pm EST.

#### NORTHERN CALIFORNIANS

It is our goal to make the joy of music possible for everyone. At any price we offer solid value, superior performance, and traditional service.

We operate on the theory that you as our customer will achieve the greatest long term satisfaction only through a careful analysis of your audio requirements. We strive to offer sober highly cost effective solutions to meet your specific needs.

#### OUR SELECTION INCLUDES:

Tandberg	Denon	B&W
Onkyo	Micro	Chartwell
JCV	Sonus	Avid
PSE	Grace	Cizek
Audire	Shure	Aiwa
Audionics	Stanton	M&K
Hafner	Grado	Ram

#### HIGH FIDELITY SHOPPE

1511 North Main  
Walnut Creek, CA 94596  
(415) 932-2242

"WE TAKE PRIDE IN WHAT WE DO"

9-8

**OHM A+ PROTOTYPES**, specially made 1978 drivers and walnut cabinets (1973). Walsh Driver 18" Titanium And Aluminum. Sacrifice \$2500.00 pair. Day (703) 982-3619, Night 563-0428. 12-8

"ONE OF THE MOST POWERFUL MEN IN SOUND," R. Guss, will custom-build 7-way 15 inch speaker system with 3-D control. Awesome fidelity. Only \$1200. (212) 580-7401. 1-9

**WIN LABS TRACKS!! AUDIO DIRECTIONS**, 8898 Clairemont Mesa Blvd., San Diego, CA 92123. (714) 278-3310. Telephone orders accepted.

## FOR SALE

**OPEN REEL TAPES.** 7½ips, Dolbyized releases from RCA, London, DG, Warner and others. Airline tapes, quad. Catalog and updates, \$1. THE REEL SOCIETY, P.O. Box 9337-A, N. Hollywood, CA 91609. 9-9

**PASSIVE CROSSOVERS!** CUSTOM BUILT TO YOUR SPECS, LOW NOISE PRECISION COMPONENTS. BI-AMP OR TRI-AMP ABSOLUTELY NO DISTORTION. \$89 EACH. C. O. G. ELECTRONICS 1-313-294-8715. 19027 ROSEGARDEN, ROSEVILLE MICHIGAN 48066 4-9

## PEDERSEN ACOUSTICS HF-1 SPEAKER SYSTEM

In audio, each of us interpret our own perception of reality. The properties which make the live performance our reference, are many. Sacrificing one of the properties for another, to us, does not represent the "state of the art".

With this in mind we are proud to present for your audition the PEDERSEN HF-1 SPEAKER SYSTEM. The speaker system we feel for many discriminating listeners, a perception of reality will be obtained.

### AMERICAN AUDIOPHILE

5 SUNRISE PLAZA  
VALLEY STREAM, N.Y. 11581  
FOR APPT: 516/561-7114

### PERFECTIONISTS PREFER DYNAKITS

Before Purchase You Owe Yourself Our Quote Mainline 11a  
971 Fronheiser, Johnstown, PA 15902 TF

### POLK AUDIO AND AUDIO DEN

The Audio Den is proud to have on display and demonstration the amazing Polk Audio Monitor Series. Our customers say "Fantastic! Compares with the finest loudspeakers I have heard. Probably the best value in the history of Audio!!" Audiogram™, from the Audio Advisor said, "We were so impressed that we could not believe the prices . . . Other \$200 speakers simply do not come close to the standards set by the Model 10 . . . And at their price, they are simply a steal!" Come in for an audition or write us for information on Polk or our other state-of-the-art products. Polk is shipped free in the continental U.S. Monitor 10-209.00 ea. Monitor 7s 149.00 ea. and the incredible Mini Monitor \$79.95 ea. Audio Den Ltd. 1320-34 Stony Brook Rd., Stony Brook L.I., N.Y. 11790, 516-751-3350. tf

**POLYDAX (AUDAX)** Bextrenes, soft domes etc., Decca Ribbon tweeters Leach Amplifiers. Catalog: TA Box 97A, W. Cornwall CT. 06796. Postage now 40¢, please help with stamps. 9-8

**Professional Hi-Fi Home Study Course** —Instructors include Len Feldman, Julian Hirsch, Larry Klein, and Larry Zide. Send \$2.00 for full color AUDIO PRIMER and information on joining (SAC) Society Audio Consultants, Dept. A. 19 W. 34th Street, Suite 1208. New York, N.Y. 10001 TF

**SPENDOR BC-1 SPEAKERS** at **AUDIOWORKS**, Box 4314, Harrisburg, PA 17111, Tel. (717) 652-6996 for info and appointment to hear.

### SPEAKER SYSTEMS

Beveridge • Rogers L35A • JR Rogers 149  
DCM • Snell Acoustics • Dahlquist • ADS  
Allison • Mitsubishi • BW • Janis

### AUDICOM HIGH TECHNOLOGY AUDIO

177 Sound Beach Ave. Old Greenwich, CT  
Phone: (203) 637-3621

## FOR SALE

### POLK AUDIO LOUDSPEAKERS AT SOUND ADVICE

We have the incredible Polk Audio Monitor Series loudspeakers in stock. The Polk's are definitely the best performance per dollar value ever offered in a truly accurated inexpensive loudspeaker. State of the art sound is now available at \$109.95 for the Model 5, \$149.95 for the Model 7A, \$209.95 for the Model 10. We ship freight prepaid anywhere in the U.S. within 24 hours upon receipt of order. Write or call for information on the Polk Audio Monitor Loudspeakers.

SOUND ADVICE

Village Plaza Ruston, LA 71270  
(318) 255-8000

9-9

### POLK AUDIO MONITOR SERIES

**AUDIO BREAKTHROUGHS** now has on demonstration the remarkable new Polk loudspeakers. Compare them to the finest loudspeakers in the world. Both the Seven (\$139.99 ea.) and the ten (\$199.95 ea.) utilize high definition polymer laminate base midrange drivers, wide dispersion soft dome tweeters and fluid coupled sub-base radiators. They are capable of reproducing a highly defined phase accurate three dimensional sonic image which rivals the thousand dollar super speakers. They sound great with a small receiver, yet reveal the fine subtleties of state of the art electronics like Levinson, Nakamichi, Essence and G.A.S. Shipped free in U.S. Send for free brochures on Polk or our other fine lines. **AUDIO BREAKTHROUGH**, 1534 Northern Blvd. Manhasset, N.Y. 11030; 516-627-7333. TF

**PROPER TONEARM GEOMETRY!!** Optimum offset angle, overhang, vertical pivot height and angle. Resonance damping construction. Jeweled pivots. Height adjustable while playing records. Effective mass 2.5 grams. Damped cueing. Anti-skate bias. TA-3A with silicone damping, \$249.00, TA-4A without damping (otherwise identical), \$199.00. "Universal" nylon hardware, \$1.00; alignment protractor, \$3.00. Prices include postage and money-back guarantee. JML Company, 39,000 Highway 128, Cloverdale, CA 95425 2-9

**PROTECT YOUR LPs. POLY SLEEVES FOR JACKET 9", ROUND BOTTOM INNER SLEEVES 8", SQUARE BOTTOMS 6", POLY LINED PAPER SLEEVES 15", while jackets 35", POSTAGE \$1.50. HOUSE OF RECORDS, HILLBURN, NEW YORK, 10931. TF**

## FOR SALE

**QUALITY VACUUM TUBE PREAMPLIFIER** The conrad-johnson stereo preamplifier offers breathtaking impact, clarity, and definition. Low noise, precision audio circuitry combined with highest quality switches and controls and elegant, durable gold anodized aluminum faceplates and knobs provide lasting beauty and performance. Available from selected dealers or direct for \$499. Write for information: conrad-johnson design, inc., 1474 Pathfinder Lane, McLean, Va. 22101. 3-9

**RABCO OWNERS** — Ultimate modification features adjustable 15-gram tone arm gimble in jewels. Effective mass 2½ grams. \$295.00. Complete modification \$395.00. Wheaton Music, 2503 Ennalls Ave. Wheaton, MD 20902-301-949-115. Photos etc \$1.00. 1-9

**RABCO-SL-8E**, Infinity Menolumia Electr-Voice EV-2's (circa 1965) D. Slindee, box 55, Lansing, IA 52151. 12-8

**RARE:** Fisher FM-1000, R-200 B (am-fm-sw) tuners; Mac 60, Mac 30 amps; JBL-LE14C, (4) E-V SP8B speakers. Make offers. Want JBL-C-56 enclosure. Bond, 821 Av., Salvador, San Clemente, Calif. 92672 (714) 498-0082. 12-8

**RARE RECORD/TAPE COLLECTOR'S DIRECTORY.** New enlarged treasury of over 250 addresses. Annotated. All categories. Send \$4.95 DIRECTORY, Dept. R, 550 East Rustic Road, Santa Monica, Calif. 90402.

**REASONABLE PRICES:** Dahlquist Speakers, Hafler & GAS preamplifiers B & O 1900 receiver, Kenwood L-07M amplifiers, Panasonic SP-10, Dynavector Tonearm (816) 444-6398. 12-8

**Reels, Cassettes, 8-Tracks, MAXWELL, TD, BASF, SCOTCH.** New Guaranteed. Listing: YELTA HOUSE, 2007 Wilshire Blvd., AD-530, Los Angeles, Ca. 90057 1-9

**RENOUNCE ROTTEN RECORDINGS!** Read selected British reviews in the bi-monthly EURO-DISC GAZETTE, then order these European discs judged the finest in technical and musical excellence. Selections mainly classical. Send for free sample issue. No obligation. EURO-DISC GAZETTE, PO Box 337-A, Peterborough, NH 03458. TF

## Season's Greetings from your JR Dealer

Absolute Audio Santa Ana, CA  
Advanced Audio Stereo Iowa City, IA  
Audible Difference, The Palo Alto, CA  
Audio Alternative Ft. Collins, CO  
Audio Arts Richmond, VA  
Audio Associates Falls Church, VA  
Audio Cage Sacramento, CA  
Audio Directions San Diego, CA  
Audio Emporium Tucson, AZ  
Audio Excellence San Francisco, CA  
Audio Limited Champaign, IL  
Audio One Birmingham, MI  
Audio Reference Systems Honolulu, HI  
Audio Renaissance Kansas City, MO  
Audio Specialists South Bend, IN  
Audio Systems & Design Lincoln, NE  
Audio Vision Santa Barbara, CA  
Audiocom Old Greenwich, CT  
Audiophile Specialists Oshkosh, WI  
British-American Sound Charleston, SC  
Charlottesville Music Center Charlottesville, VA  
Chestnut Hill Audio Philadelphia, PA  
Contemporary Sound Associates Fairfield, NJ  
Custom Electronics Lexington, KY  
D&F Electronics Memphis, TN  
Digital Sound Virginia Beach, VA  
Dimensions in Stereo Torrance, CA  
DKL Sound Lab Silver Spring, MD  
Electronics Workshop New York, NY  
Ettienne LeFlore Fullerton, CA  
Family Music Center Lynchburg, VA  
Garland Audio San Jose, CA  
George Blomback Electronics Hawthorne, NJ  
Gordon Miller Sound Towson, MD  
Green Audio/Video Kalamazoo, MI  
HiFi Buys Indianapolis, IN  
HiFi Haven New Brunswick, NJ  
Higher Fidelity Decatur, IL  
House of Music San Francisco, CA  
Jonas Miller Sound Beverly Hills, CA  
Linear Sound New York, NY  
Listen Up! Audiosystems Denver, CO  
Louis Peinado El Paso, TX  
Lyric HiFi New York, NY  
Marshall Music East Lansing, MI  
Northridge Audio Center Northridge, CA  
Paul Heath Audio Chicago, IL  
Paul Heath Audio Rochester, NY  
Pro Audio Windber, PA  
Record Shop, The Cherry Hill, NJ  
Sassafras Audio Montgomeryville, PA  
Sound Environment Minneapolis, MN  
Sound Trak Erie, PA  
Soundpost HiFi Morgantown, WV  
Soundpost HiFi Princeton, WV  
Stereo Emporium Buffalo, NY  
Stereo Lab Indianapolis, IN  
Stereo One Rochester, NY  
Stereo Shop, The Pasadena, CA  
Stereo Sound Chapel Hill, NC  
Stereo workshop Ridgely, CT  
Systematic Sound Rockton, IL  
Upstairs Audio W. Columbia, SC  
Universal Sound Fairfield, IA  
Vere Smith Audio/Visuals Athens, OH  
Woodland Stereo Center Woodland Hills, CA

151

**TASCAM**  
**by Teac**  
... we've got the  
line in stock at the  
old prices.  
CALL OR WRITE TODAY

**CUSTOM STEREO**

1391 S. Hamilton Rd. Columbus OH 43227  
614/235-7575

the audio advocate

★  
SME  
AVID  
POLK  
ONKYO  
SHURE  
DECCA  
DENON  
QUATRA  
LS 35 A  
ARISTON  
PARAGON  
ACOUSTAT  
MAGNEPAN  
FORMULA 4  
DAHLQUIST  
NAKAMICHI  
AUDIO RESEARCH

505 Millburn Avenue Millburn, NJ  
(201) 467-8988

### ONLY THREE THINGS REALLY MATTER IN A PREAMP'S PERFORMANCE

1. Accuracy of frequency response 2. Low noise 3. Low distortion

The DB Systems DB-1A has...

1. The most accurate phono equalization available ( $\pm 0.07$  dB 10Hz - 40kHz).
2. Noise as low as any on the market with actual cartridge attached (moving magnet type).
3. The lowest distortion of any preamp available (less than 0.0008%, 20Hz - 20kHz).



DB SYSTEMS • P.O. Box 187 • Jaffrey Center, NH 03454

## FOR SALE

**RENT LEASE TV'S ANYONE CAN!** Easy to start and operate. Even from your home. Send \$2.00 for basic plan. Perry's TV P.O. Box 1407, Santa Maria, CA 93454.

**REVOX A-700.** Mint. B/O over \$1250. (201) 625-4423 6-10 p.m.

**REVOX A-77** (1104 or 1304) AT LOW, LOW PRICE \$695. Brand new batch just received in manufacturers sealed cartons, manufacturers warranty. It's a steal. Other models available including a few reworked but top performance A-700's at \$1350. Write for full listing or make checks or money order (\$695 & \$15 freight & handling A-77, NY residents add appropriate sales tax) payable to Entertainment Sound Services, Inc., 78 North Franklin St., Hempstead, NY 11550 (516) 538-2220. tf

**WIN LABS TRACKS!! AUDIO DIRECTIONS,** 8898 Clairemont Mesa Blvd., San Diego, CA 92123. (714) 278-3310. Telephone orders accepted.

### SAVE UP TO 40% ON DIRECT DISCS

Select from over 250 different direct discs. PCM, and Japanese Audiophile records. Over 30 labels to choose from. Send \$1 for complete list and prices. DYNAMIC DISCS, P.O. BOX O, Tarzana Ca. 91356. 2-9

**SAVE UP TO 69% ON OVER 100 TOP BRAND AUDIO COMPONENTS FROM CARSTON STUDIOS.** NEW ENGLAND'S AUDIO SUPERMARKET ONE OF THE OLDEST MAIL ORDER FIRMS (EST 1952) AND CERTAINLY ONE OF THE MOST RELIABLE. ALL ORDERS SHIPPED FROM STOCKED WAREHOUSE. SEND FOR PRICE QUOTE AND PRICE LIST. CARSTON STUDIOS, OLD BROOKFIELD ROAD, DANBURY, CONN. 06810. TF

**SEMI—PRO AND CONSUMER TAPE EQUIPMENT, HEADPHONES.** TEAC/Tascam, Technics, Dbx, MAXELL. Best Prices! Prompt Delivery! WDI P.O. Box 340, Cary NC 27511. 919-467-8122. 1-9

## FOR SALE

**"SCA: RADIO THE FCC DOESN'T WANT YOU TO OWN"** article included with purchase of FM-SCA adapter, featuring squelch, good tone quality; detailed instructions from FM-SCA, Adolf MN 55701. \$13 kit; \$18 wired unit. Sat. guaranteed. 12-8

**SELLING 100 RECORDS** of classical music only. Mostly imported. Excellent condition. \$225.00. 12-8

**SEX is not a part of The Hi-Fi game.** But it's great fun anyway. A board game for the non-bored. Immediate delivery. \$11.95 to PENIJON GAMES, Box 2129, Martinez, CA 94553. tf

**SIEMENS, TELEFUNKEN, GENALEX AND AMPEREX** and other top quality audio tubes available at very competitive prices. Contact Jim Wallace at 201 McMasters Drive, Monroeville, Penna. 15146 or (412) 322-4706 TF

**SONY ITS 3000AT.T.** \$250.00, Decca Int. tone arm (old style) \$100.00, Fulton J speaker cables 42' \$150.00, Decca MK V export \$45.00, Paoli SP3A Mod. \$30.00. 1-216-658-4675. 12-8

**SONY TC-153 SD** Portable stereo Dolby cassette deck. Excellent condition, \$200. (404) 633-3822.

**SONY 4 ch.** Decoder/Amp - 2030. Mint - \$100.00 - Bob Day. 212-889-8000, Evenings 201-846-3015.

### SOUND COMPONENTS INC.

EXCLUSIVE SOUTHEAST DEALER FOR THE INCOMPARABLE MARK LEVINSON H.Q.D. REFERENCE SYSTEM

The H.Q.D. reference playback system consists of the following components:

- 2 Hartley 24 in sub-woofers
- 4 Quad ESL loudspeakers
- 2 Decca ribbon tweeters (modified)
- 2 Levinson LNC-2 Crossovers (100 hz & 7 Khz)
- 1 Levinson ML-1 (LEMO) preamp
- 6 Levinson ML-2 amplifiers
- 1pr. Hand-crafted oak or ash trestle stands (for Quads & Decca)

THE H.Q.D. SYSTEM WITH GOOD SOURCE MATERIAL, WILL REPRODUCE A MUSICAL EVENT BETTER THAN ANY SYSTEM WE KNOW OF.

For more information, please write or call:

SOUND COMPONENTS  
2710 Ponce de Leon Boulevard  
Coral Gables, Florida, 33134  
305-446-1659

TWX 812-848-7627 tf

**SPEAKER DRIVER UNITS** direct from manufacturer. Speaker-world, Box 525, Newark, CA 94560.

## FOR SALE

	<b>GOLDEN gramophone</b>	2858 W. Market Street Akron, Ohio 44313 Phone (216) 864-4411
	Direct Discs	Hafler
	Audio Research	Grace Rogers
	Advent	Dynavector
	ADS	Electro Research
	Armstrong	E M T
	Bravura	FMI (Fulton J)
	Connoisseur	Grado Signature
	Denon	GAS Ampzilla II
		Kenwood
		LinnSondek
		Magneplanar
		Nakamichi
		Rappaport
		Revox
		Shure III G
		Sonus
	Stax	
	Technics	
	Threshold	

**Speaker Repairs by AST.** Give new life to your older speakers. Servicing speakers since 1933. Audio Speaker Technics, 281 Church St., New York, N.Y. 10013 (212) 226-7785 12-8

**STANLEY AUDIO SYSTEMS** — Presents the TD-1000 Monitor System. Designed for the Perfectionist, who doesn't want a bulky box in the Living Room. (\$499.00 ea.) Write for (free) full brochure, Box 536, Silver Lake Wis. 53170.

### STATE OF THE ART IN N. CALIFORNIA

is now on demonstration at The Audible Difference. Hear the superb Threshold NS-10 preamp/400A power amp through Dick Sequerra's stunning Metronome loudspeakers. Audition Peter Snell's superb Snell Acoustics Type A loudspeaker system with Threshold's new medium power CAS-1 amplifier. For the ultimate in high-power amplification, audition the Threshold 8000A mono amplifiers. Hear how good a bi-amp system can be with John Curtl's new transient perfect crossover from Symmetry, the ACS-1, plus Paragon's 125 watt solid state bass amp. Experience the beautiful new Paragon 12A preamp, plus Thaedra II from G.A.S.

Hear the ultimate direct drive turntable, the Denon DP-6000, plus the audiophile reference Linn Sondek with Linn-modified Grace 707 tonearm. Examine the precisely machined bearing of the new glass platter, belt drive Planar tables from Rega Research. Hear the ultra-musical Paragon System E preamp, plus the new high performance, moderate cost Thalia/grandson combination from G.A.S. Audition a new generation of compact high performance loudspeakers from Polk and Cizek, plus BBC minimonitors from Spondor and Rogers. For the music listener who demands the best, we offer the Breuer Dynamic Tonearm, plus the EMT cartridge with Verion transformer.

For that extra measure of sonic purity so important to the critical audiophile, we recommend and stock Polk Sound Cables; Mogami wire; the anti-resonant Platter Pad, \$24.95; Audio Perfection audio interconnect low capacitance cables, \$15/pr; plus the Stylift at \$19.95 and a wide selection of audiophile quality recordings including Gale Maximum, Fidelity and Denon PCM.

We ship all products prepaid throughout the United States.

THE AUDIBLE DIFFERENCE  
435 Tasso, Palo Alto, CA 94301  
(415) 328-1081

TF

### STEREO REPRESENTATIVES NEEDED!!!

Sell 100 brands!! Lowest Possible Prices!! Krasco—REP DEPT. —998 Orange Ave. West Haven, Conn. 06516 TF

**AUDIONICS** in Eastern Pennsylvania, at **AUDIOWORKS**, Box 4314, Harrisburg, PA 17111. Tel. (717) 652-6996 for info and appointment to hear.

## A SINGER'S DREAM!

**REMOVES VOCAL FROM MOST STEREO DISCS**  
The Thompson Vocal Eliminator can actually remove most or all of a solo vocalist from a standard stereo record and yet leave the background music virtually untouched! Not an equalizer! We can prove it works over the phone. Write for a brochure and demo record below. COST: \$195.00

**ECHO Ambiance**  
We do it BETTER for LESS  
Whether your interest is in using ambiance for a concert hall effect or as an echo chamber for studio recording use, we manufacture a broad line of sophisticated analog delay Echo and Reverberation devices at prices which only direct sales make possible. Prices range from \$159 to \$495.  
Write for a brochure and demo record. Include \$1 to cover costs (refundable with order).  
Write to: **LT Sound**, Dept AU, P.O. Box 1061, Decatur, GA 30031 (404) 284-5155

Exclusive Conn. dealers for Dick Sequerra's Metronome 2 + 2W Loudspeaker.

**Take 5**  
Progressive Audiophile Services

<b>PYRAMID</b>	<b>M&amp;K</b>
<b>RAPPAPORT</b>	<b>DENON</b>
<b>BRYSTON</b>	<b>HAFLER</b>
<b>WATSON LAB</b>	<b>SYMDEX</b>
<b>PROMETHEAN</b>	<b>JR 149</b>
<b>KEITH MONKS</b>	<b>ADC</b>
<b>SOUND CABLE</b>	<b>CYBELE</b>

- One of the EAST COAST'S largest Direct Disc dealers
- KEITH MONKS record cleaning center
- Large consignment listings
- Appointments available any evening

**TAKE 5 AUDIO**  
32 ELM ST.  
NEW HAVEN, CT. 06510  
(203) 777-1750

**GA GARLAND AUDIO, INC.**

**WHERE ONLY THE FINEST IS GOOD ENOUGH**

AUDIO RESEARCH	GRACE	MARK LEVINSON
MAGNEPAN	NAKAMICHI	SEQUERRA
LUX	MICRO SEIKI	GALE

—two northern california locations—

**SAN JOSE** 2960 Stevens Creek Blvd. (408) 244-6724  
**BERKELEY** 3101 Telegraph Ave. (415) 841-1591

Tues/Thurs, 11-8 — Wed/Fri, 11-6 — Sat, 10-5 —and by appointment—

## FOR SALE

**VAN ALSTINE DYNA MODS** FOR ST-400, ST-416, ST-410, ST-150, PAT-5, PAT-5 BIFET FM-5 are still the best. New \$10.00 improvement kit for Dyna PAT-5 BIFET. Double 400 conversions for both ST-400 and ST-416. Free mod instructions for ST-70, MK-111 and PAS-3X. \$100 audio circuit mods for ARC SP3-A1 All new DC coupled VAN ALSTINE MODEL 1 preamp and MODEL 2 power amp. Crown tape electronic mods coming soon. Jensens Stereo Shop, 2202 River Hills Dr., Burnsville, Minnesota 55337 612-890-3517 12-8

**STEREOPUS**, the quarterly equipment review journal, in its current issue reviews the Snell Type A, Tympni ID, Grado Signature 1B, Van Alstine Model One, Hafler DH-101, Audionics BT-2, Grandson of Ampzilla, Pioneer M-22 (Class A power amp), Sony EL-7, Teac-Tascam 25-2, and much, much more. \$12.50/year (four issues) first class. \$16.00/year overseas. P.O. Box 509, Shalimar, Florida 32579. 11-8

### STEREO SAVINGS

Nearly all brands, guaranteed lowest prices. Send stamped envelope for quote. Stereo Savings box 2465, Providence R.I. 02906 12-8

**SUPEX—ORTOFON—DENON—OTHER MOVING COIL CARTRIDGE OWNERS:** Send for free literature on our Micro Preamp Superb performance at \$129.95 Huntington Electronics, Box 2009A, Huntington, Conn. 06484 TF

### TACTILE MASS MEDIA

A new recording industry is beginning, not for the eyes, or ears, but for the skin. You touch the message. Each recording feels different. You can identify objects and different people, and music through the skin is a unique and highly entertaining experience. Patented pre-production prototypes are being released. Many business opportunities are still available. For more information contact: HOW WACHSPRESS, AUDITAC, 1940 Washington, San Francisco, CA 94109. (415) 885-3138.

**TANDBERG MODEL 62** half track open reel deck. Recent factory overhaul and rebias for to-noise hi-energy tape. Teak base, lucite top, factory carrying case. \$100. firm. Weisenberg, 2700 Henry Hudson Pkwy., Bronx, NY 10463. (212) 796-4086

**TAPCO and ELECTRO-VOICE**, mixers, equalizers, amps, mics, and raw loudspeakers. Write for low mail order prices. Sonix Co., P.O. Box 58, Indian Head, MD 20640 8-9

Audio and TV tubes factory boxed, speakers, semiconductors—low prices, free price list. Transiseterioric Inc., 1365-39th St. Brooklyn, N.Y. 11218 212-633-2800 TF

**AUDIO BARGAINS — FREE LIST.** Closeout/Bankrupt specials Stereo Cost Cutters, Box 8014A, Canton, OH 44711 2-9

The **Audiogram TM**, a pithy independent newsletter, selects the classics of tomorrow from the latest products. Our critical integrity and realistic sense of proportion fill the gap between commercial magazines and the neurotic underground press. \$10/4 issues/one year first class; overseas \$15./airmail. Audiogram, Box 27406, St. Louis, MO 63141.

Our October issue:

- the best tube preamp
- the best transistor preamp
- the best cartridge
- the best direct drive turn table mat
- the Ultracraft AC300 II arm
- Spendors BC-1
- Bryston 4-B, etc.

## PHONO INPUT FILTER

Don't let interference from CB, ham radio, broadcast stations, TV games, hobby computers bug your Hi-Fi system. Just plug PHONO INPUT FILTERS directly into phono input jacks for interference-free enjoyment. Send SASE for free interference cures. At your dealer or order direct...  
 SET OF 2 \$8.95  
**ELECTRONIC SPECIALISTS, INC., Dept A**  
 171 South Main St., Natick, Mass 01760

## FOR SALE

**THE ABSOLUTE SOUND™**, in its new issue, reviews the Audio Research SP-6 (tubes, no less), the Grado Signature III, the Acoustai Monitor, the (new) Quatre gain cell, the Threshold CAS-1; the ReVox straight-line turntable. Three cartridges: the Es'Ans, the Sumo, and the Stanton 881S; the Phase Linear 500 amp; the Soundcraftsmen Class H amp; the Visonik speaker system; the Promethean cartridge; the Mordant-Short Pageant speaker system. Also: There are sneak previews of the Threshold 4000 and the Signet moving coil cartridge, plus an interim report on the Spatial Coherence preamp. And, finally, (surprise), a state-of-the-art speaker system — though you'll never guess what. Plus: Reference Recordings; Technical Tips; Updated Reports, and a bevy of other special articles. Do yourself a favor. Subscribe. Prices: \$16 (first class; four issues); \$17 (Canada); \$24 (outside North America; air mail). Checks go to The Absolute Sound, Box L, Drawer A, — Sea Cliff, New York, 11579.

The **BERKSHIRE MATCH-MAKER** is the perfect method to correctly match your cartridge to its preamp. It is a switchable adapter that plugs into the preamp and offers 18 different loading conditions, from 50 to 350 pF. Also permits varying resistive loading and as an added plus includes an RF filter. \$49.95/set of 2.

The Berkshire MODEL CCM CAPACITANCE METER is a hand-held precision capacitance meter that measures the capacitance of your tonearm cables and preamp phono input. For the ultimate in cartridge/preamp matching. \$89.95 Order directly. Immediate delivery. Fully guaranteed. Literature available. BERKSHIRE AUDIO Products, P.O. Box 35, Great Neck, N.Y. 11021.

**THE BEST** stereo system for under \$1000. At \$599, we have found nothing better than the incredible Bose 360 System. Write or call about the 120T brands we carry. Audition by appointment. Grunion Audio, 1535 Barrington, P.O. Box 1911, Ann Arbor Mi. 48106. (313) 662-0267. Shipping Free in U.S. 12-8

### THE LISTENING ROOM INC.

590 Central Park Avenue  
 Scarsdale, N.Y. 10583  
 (914) 472-4558

Cordially invites you to audition our fine line of equipment. THRESHOLD • BRYSTON • GREAT AMERICAN SOUND • PYRAMID METRONOME 2 + 2 • DAYTON WRIGHT ESL • QUAD ESL • SNELL ACOUSTICS • DAHLQUIST • DYNAVECTOR • DENON • YAMAHA • TANDBERG • POLK AUDIO • LUX REF. • KEF • GRACE • NAKAMICHI • STAX • R.H. LAB • LS3/5A BBC MINI MONITOR BY CHARTWELL • SEQUERRA • PHASE MATRIX • HAFLER • JANIS • FONTEK HEADPHONE • AUDIO PULSE • SPATIAL • OASIS • EMT • VERION • DIRECT TO DISK RECORDS.

Visit our private studios. We ship free anywhere in the U.S. We invite inquiries. 12-8

**THE NEW REFERENCE — CROWN DL-2** — Using the latest technology is the most accurate, flexible system controller available. The DL-2 may be critically auditioned along with the SA-2 power amp and EQ-2 equalizer at Sounds Good To Me! 60 Shiawassee Ave. Akron, O: 44313 1-9

## BUILD YOUR OWN SPEAKERS

Save 50% or more...



**FREE KIT BROCHURE**  I'm interested — send me your free brochure (kits from \$59.00 each).

**\$1.00 catalog/manual**  Give me all the details send me your comprehensive speaker manual on kits, x-overs, raw components and engineering data \$1.00 enclosed.

# Acusta Craft

Dept. AU P.O. Box 12030 Shawnee Mission, Ks. 66212

## FOR SALE

The perfect Christmas gift is THE HI-FI GAME; a board game for everyone! And, as a Christmas special, buy one game at our regular price of \$11.95 and get a second game at half price. Order now; immediate delivery from PENIJON GAMES, Box 2129, Martinez, CA 94553. 12-8

**THE SOUND WORKS**, Green Brook Shopping Village 221A Route 22, Green Brook NJ 968-7200 REMEMBER we will meet their price but they can't beat our service. 1-9

## THE SYMDEX SIGMA

There are few, if any, mini speaker systems which offer truly flat frequency response. Instead, they use a boosted upper base to give the impression of good low frequency response, and a peaked trouble response to simulate extended high frequency response. The SYMDEX SIGMA is the exception, having remarkably flat frequency response (58-20kHz ± 1.5 db) and time domain characteristics which other speakers cannot approach. Audition the SYMDEX SIGMA along with our other fine products which include AUDIONICS, AGI, CIZEK, DCM TIME WINDOWS, DECCA, DENON, HADCOCK, HAFLER, HEGEMAN, JANIS, NEXUS, PEDERSEN, RAPPAPORT, SERIES 20, SHURE, SINGNET, SME, STD, and TANGENT.

## AMERICAN AUDIOPHILE

5 SUNRISE PLAZA  
 VALLEY STREAM, N.Y. 11581  
 FOR APPT: 516/561-7114

### THRILLING DIGITAL TELARC RECORDING!

Fredrick Fennell, Cleveland Symphonic Winds, with new Soundstream process. Bach, Handel, Holst as never before. \$14.95 plus \$1.00 P.&H. MasterCharge, VISA, Write for free catalog Direct-to-Disc and other audiophile recordings on RCA-Japan, Sonic Arts, Toshiba-EMI, Umbrella Labels, as well as quality audio accessories. Interstate 80 Marketing P.O. Box 5367, Akron, OH 44313 12-8

153

## Western Pennsylvania's FINEST AUDIO

Mark Levinson

Bryston

Dayton Wright

Watson Lab

Snell Acoustics

Rogers LS3/5A

Van Alstine

Hegeman Hapi One

Hafler

Magneplanar

Dahlquist

Janis Woofers

M&K Woofers

Denon

Ariston

Connoisseur

Thorens

Fidelity Research

Supex

Grace

Black Widow

J.H. Formula 4

Decca

dbx

Verion

Nikko

S.A.E.

Luxman

Accuphase

Marantz

Armstrong

Sherwood Micro CPU

Infinity

AR

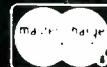
AEI

Visonik

VISA

PLUS MUCH MORE

Shipping Prepaid & Insured



# OVATION

6019 Broad St. Mail Pittsburgh, Pa. 15206

412-441-4550

# Advertising Index

Advertiser	Page	Advertiser	Page	Advertiser	Page
ADC	28	Audio-technica	56, 58, 60, 117, 122, 138	Discwasher	2, 45
XLM MkIII Cartridge		Phono Cartridge		Gold-ens Cables	
Enter No. 1 on Reader Service Card		Enter No. 11 on Reader Service Card		Write Direct to Advertiser	
ADS	47	Headphones		Record Cleaners	
ADS 10 Digital Time Delay System		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		Telarc Record		Dolby	91
AKG	31	Write Direct to Advertiser		Dolby FM	
Phono Cartridge		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		Audio Technology	163	Dual (United Audio)	59
Acoustical Mfg	134	Power Meter		819 Cassette Deck	
Quad Speaker		Write Direct to Advertiser		Enter No. 18 on Reader Service Card	
Enter No. 4 on Reader Service Card		B & F	141	Electronic Specialties	149, 153
Acusta Craft	153	Speaker Kits		Hi-Fi Components	
Speaker Kits		Enter No. 15 on Reader Service Card		Write Direct to Advertiser	
Write Direct to Advertiser		BGW	95	Electro-Voice	26
Aiwa	87	750 Series Amplifiers		Loudspeaker Systems	
Hi-Fi Components		Enter No. 16 on Reader Service Card		Enter No. 20 on Reader Service Card	
Enter No. 12 on Reader Service Card		B.I.C.	17	Empire Scientific	5
Allison Acoustics	139	Cassette Decks		Phono Cartridges	
Loudspeaker Systems		Enter No. 7 on Reader Service Card		Enter No. 21 on Reader Service Card	
Enter No. 13 on Reader Service Card		BSR	50, 51	EMS, Inc.	160
Apt Corporation	116	Turntables		Speakers	
Preamplifier		Enter No. 2 on Reader Service Card		Write Direct to Advertiser	
Enter No. 14 on Reader Service Card		Ball	61	Etco	148
Audio Advocate	151	Record Preservation Kit		Quad Record Demodulator	
Hi-Fi Components		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		Bose	77	Eumig	107
Audio Com	145, 146, 150	901 Speaker		Cassette Decks	
Hi-Fi Components		Write Direct to Advertiser		Enter No. 22 on Reader Service Card	
Write Direct to Advertiser		Bryston Mfg. Ltd.	116	Fidelity Research	143
Audio Critic	142	Amplifiers		Phono Cartridge	
Publication		Write Direct to Advertiser		Enter No. 23 on Reader Service Card	
Write Direct to Advertiser		Chestnut Hill Audio	160	Garland Audio, Inc.	152
Audio Excellence	145	Audio Store		Audio Store	
Hi-Fi Components		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		Columbus Electric Co.	146	Golden Gramophone	152
Audio General	90	Headphone Power Amplifier		Hi-Fi Components	
Preamplifier		Write Direct to Advertiser		Write Direct to Advertiser	
Enter No. 5 on Reader Service Card		Consumers Co.	163	Great American Sound	137
Audio Horizons	147	Magnetic Tape		Amplifier, Preamplifier	
Publication		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		Crown	25	Great White Whale	135
Audio Insight	150	Preamplifier		Loudspeaker Systems	
Audio Components		Write Direct to Advertiser		Enter No. 24 on Reader Service Card	
Write Direct to Advertiser		Custom Craft	143	H & H International	147, 149, 151
Audiophiles Sound Studio	146	Loudspeaker Systems		Speakers	
Sound Recording Studio		Enter No. 17 on Reader Service Card		Write Direct to Advertiser	
Write Direct to Advertiser		Custom Stereo	151	Hafler	145
Audio Pulse	73	Hi-Fi Components		Preamplifiers	
Digital Time Delay Computer		Write Direct to Advertiser		Write Direct to Advertiser	
Write Direct to Advertiser		D B Systems	151	Hammond Industries (Beyer)	4
Audio Reference Systems	149	Preamplifiers		Beyer Headphones	
Speaker Kit		Write Direct to Advertiser		Enter No. 25 on Reader Service Card	
Write Direct to Advertiser		Decoursey Engineering	147	Harman-Kardon	79
Audio Source	118, 119, 126, 131	Electronic Crossovers		Cassette Decks	
Monitor Speakers		Write Direct to Advertiser		Write Direct to Advertiser	
Enter No. 6 on Reader Service Card		Denon	121	Henry's	146
SAEC Tonearm		Cassette Deck		Hi-Fi Store	
Enter No. 10 on Reader Service Card		Write Direct to Advertiser		Write Direct to Advertiser	
UHD Cables		Discount Music Club	161	Hervic	120
Enter No. 8 on Reader Service Card		Record Club		Hi-Fi Components	
Stylift Tonearm Lift		Write Direct to Advertiser		Enter No. 26 on Reader Service Card	
Enter No. 9 on Reader Service Card				High Definition	150
				Direct-to-Disc Recording	
				Write Direct to Advertiser	

# Advertising Index

Advertiser	Page	Advertiser	Page	Advertiser	Page
Hitachi	81	Osawa	114, 115	Sonic Research	125
SR-804 Receiver		Phono Cartridges		Phono Cartridges	
<b>Write Direct to Advertiser</b>		<b>Enter No. 41 on Reader Service Card</b>		<b>Enter No. 61 on Reader Service Card</b>	
Integrex	143	Ovation Audio	153	Sonikit	160
Dolby Kits		Audio Components		Speaker Kits	
<b>Enter No. 27 on Reader Service Card</b>		<b>Write Direct to Advertiser</b>		<b>Write Direct to Advertiser</b>	
International Hi-Fi	136	PAIA	144	Sony	57
Mail Order Hi-Fi Store		Electronic Music Products		Hi-Fi Components	
<b>Enter No. 28 on Reader Service Card</b>		<b>Enter No. 42 on Reader Service Card</b>		<b>Enter No. 58 on Reader Service Card</b>	
J & R Music	131	PS Audio	130	Sound Advice	147
Discount Catalog		Hi-Fi Components		Used Stereo Equipment	
<b>Enter No. 29 on Reader Service Card</b>		<b>Enter No. 43 on Reader Service Card</b>		<b>Write Direct to Advertiser</b>	
JVC	11	Phase Linear	23	Sound Components	148
Receiver		D-500 Loudspeaker		Hi-Fi Components	
<b>Enter No. 30 on Reader Service Card</b>		<b>Write Direct to Advertiser</b>		<b>Write Direct to Advertiser</b>	
Jensen	41, 129	Pickering	3	Soundcraftsmen	49
Car Stereo		D-500 Loudspeaker		Hi-Fi Components	
<b>Write Direct to Advertiser</b>		<b>Enter No. 44 on Reader Service Card</b>		<b>Enter No. 57 on Reader Service Card</b>	
Car Stereo Speakers		Pioneer	Cover II, 1, 55	Speakerkit	160
<b>Write Direct to Advertiser</b>		SX-780 Receiver		Speaker Kits	
KEF	105	<b>Enter No. 45 on Reader Service Card</b>		<b>Write Direct to Advertiser</b>	
Speaker Systems		Hi-Fi Components		Speaker Information Kit	141, 150
<b>Enter No. 31 on Reader Service Card</b>		<b>Enter No. 46 on Reader Service Card</b>		<b>Write Direct to Advertiser</b>	
Kenwood	89	Playback	144	Spectro Acoustics	12
KR-8010 Receiver		Discount Catalog		Equalizers	
<b>Write Direct to Advertiser</b>		<b>Enter No. 47 on Reader Service Card</b>		<b>Enter No. 56 on Reader Service Card</b>	
Koss	39	Primo	28	Studer-Revox	27
Pro/4 AAA Headphones		Microphones		B77 Tape Deck	
<b>Enter No. 32 on Reader Service Card</b>		<b>Enter No. 48 on Reader Service Card</b>		<b>Enter No. 59 on Reader Service Card</b>	
LT Sound	152	RST Audio Products	148	Sumiko	120
Hi-Fi Components		Turntable Levelling Device		Hi-Fi Components	
<b>Write Direct to Advertiser</b>		<b>Write Direct to Advertiser</b>		<b>Enter No. 62 on Reader Service Card</b>	
Lux	101	Radio Shack	53	Superex	140
Hi-Fi Components		SCT-30 Cassette Deck		Headphones	
<b>Write Direct to Advertiser</b>		<b>Write Direct to Advertiser</b>		<b>Enter No. 60 on Reader Service Card</b>	
Marantz	166, Cover III	Rank	99	TDK	20, 21, 34
Hi-Fi Components		Speaker		Magnetic Tape	
<b>Write Direct to Advertiser</b>		<b>Enter No. 49 on Reader Service Card</b>		<b>Enter No. 67 on Reader Service Card</b>	
Martin Speaker Div., Eastman Sound	24	SAE	82, 83	Head Demagnetizer	
Speakers		Hi-Fi Components		<b>Enter No. 68 on Reader Service Card</b>	
<b>Enter No. 19 on Reader Service Card</b>		<b>Enter No. 50 on Reader Service Card</b>		TEAC	35, 123
Maxell	16, 19	SME Limited	6	A-800 Cassette Deck	
Magnetic Tape		Tonearm		<b>Write Direct to Advertiser</b>	
<b>Enter No. 33 on Reader Service Card</b>		<b>Enter No. 51 on Reader Service Card</b>		Mixing Consoles	
Magnetic Tape		Sansui	14, 15	<b>Write Direct to Advertiser</b>	
<b>Enter No. 34 on Reader Service Card</b>		Hi-Fi Components		Take 5	152
McIntosh	113	<b>Enter No. 52 on Reader Service Card</b>		Hi-Fi Components	
MX-113 Tuner Preamplifier		Saxitone	163	<b>Write Direct to Advertiser</b>	
<b>Enter No. 35 on Reader Service Card</b>		Magnetic Tape		Tandberg	18
McKay Dymek	131	<b>Write Direct to Advertiser</b>		Actilinear Recording System	
AM Antenna		Sennheiser	97	<b>Enter No. 63 on Reader Service Card</b>	
<b>Enter No. 36 on Reader Service Card</b>		Headphones		Technics	7, Cover IV
Micro Acoustics	13	<b>Write Direct to Advertiser</b>		Hi-Fi Components	
FRM-3 Speaker		The Sensible Sound	145	<b>Enter No. 64 on Reader Service Card</b>	
<b>Write Direct to Advertiser</b>		Hi-Fi Components		Turntable	
Mitsubishi	32, 33	<b>Write Direct to Advertiser</b>		<b>Enter No. 65 on Reader Service Card</b>	
Car Audio Systems		Sescom	136	Toshiba	103
<b>Enter No. 37 on Reader Service Card</b>		MI-Series Audio Transformer		5460 Cassette Deck	
Nakamichi	127	<b>Enter No. 53 on Reader Service Card</b>		<b>Enter No. 66 on Reader Service Card</b>	
730 Receiver		Shure	132, 133	Wisconsin Discount	136
<b>Enter No. 38 on Reader Service Card</b>		Phono Cartridge		Discount Hi-Fi Store	
Nikko	85	<b>Enter No. 54 on Reader Service Card</b>		<b>Enter No. 69 on Reader Service Card</b>	
Hi-Fi Components		Stylus		Yamaha	29
<b>Enter No. 39 on Reader Service Card</b>		<b>Enter No. 55 on Reader Service Card</b>		NS-10M Mini-Monitor	
Onkyo	93			<b>Write Direct to Advertiser</b>	
Hi-Fi Components					
<b>Enter No. 40 on Reader Service Card</b>					

**FOR SALE**

**LEGENDARY.**

Mark Levinson. Threshold. Grado Signature. Janis. Pyramid. Grace. Spendor. Rogers. DCM. Paragon. DB. Bryston. Paoli. Linn-Sondek. Bowers & Wilkins. Denon. Verion. Dunlap-Clarke. All these legends at Chestnut Hill Audio, 2302 Lombard Street, Philadelphia, Pa. 19146. (215) KI 6-6178.

**CHESTNUT HILL AUDIO.**

**BGW-1000 (2).** Mint R. Bailey 216 Stade Ave. Baho, Md. 21208 (301) 486-4324. 1-9

**BOSE 901 SPEAKERS** Sony TA 2000 TA 3200 F Heath PA 1640 Dyna PAS 3, PAT 4 No reasonable offer refused. Telephone 201-262-8598

**BOULDER SOUND GALLERY, LTD.** - COLORADO'S AUDIO DEALER WITH A POINT OF VIEW. WE CARRY LUX L.R.S., B&W, MARK LEVINSON, DAHLQUIST, POLK, CONRAD-JOHNSON, K-M SYSTEM, VAN ALSTINE, QUAD, ULTRA-PHASE, SUPEX, STAX, DENON, ADC TONEARMS, SIGNET, ENTRE, REVOX, B & O, JANIS, AND CHARTWELL LS-3/5 A. IF YOUR GOAL IS TO GET FROM THE SOURCE MATERIAL BACK INTO THE AIR WITH THE LEAST POSSIBLE CHANGE. WE CAN HELP. 1200 PEARL. BOULDER, COLORADO 80302, 303-444-2626.

**B & O 4002 USES "ANY" CARTRIDGE** with standard mounting centers after our modification. Effective mass 2.5 grams. Adjustable silicone damping. \$199.00 with money-back guarantee. JML Company, 39,000 Highway 128, Cloverdale, CA 95425 8-9

**CABINETS FOR DYNACO** Preamps, tuners, quadaptor, stereo 120. Literature, Geometrix, Box 612, Mexico, Mo. 65265

**CITATION I preamp,** Citation II power amp. Completely reconditioned. Both for \$350. Call for details. (513) 861-4318.

**WIN LABS IN STOCK!! AUDIO DIRECTIONS,** 8898 Clairemont Mesa Blvd., San Diego, CA 92123 (714) 278-3310. Telephone orders accepted.

**COLLEGIATE RESEARCH PAPERS.** ALL SUBJECTS. 10,250 ON FILE. IMPROVE YOUR GRADES! SEND \$1.00 TODAY FOR 256-PAGE CATALOG. RAPID DELIVERY. BOX 25918-AD, LOS ANGELES, CALIF. 90025. (213) 477-8226. 4-9

**AUDIOPHILE SOUNDING BOARD** free audio Journal; 235 Durand East Lansing, MI 48823; send S.A.S.E.

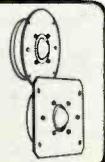
**ATTENTION FLORIDA AUDIOPHILES**

Components of the highest caliber from manufacturers such as: Acoustat, Armstrong, Audionics, Audire, Bryston, Denon, Celestion, DCM (Time Windows), Goldring, Grace, Grado, KEF, Epicure, Hafner, Linn Sondek, Luxman, M&K, Mayware, Revox, Paragon, RH Labs, Scott, Sonus, Supex, Threshold, Visonik, and more. Plus, knowledgeable audio consultants and three listening rooms make us well worth the drive. Stop in!

**AUDIO EXCELLENCE**  
Longwood Village  
1-4 and State Road 434  
Longwood, Fl. 32750  
(305) 834-9344

**Lambda Series II by SpeakerKit, Ltd.**

Woofers with butyl surrounds. Transmission lines. Open dome midrange and tweeters. Infra-woofers and ultra-tweeters. Accurate sound at a reasonable price. Send 25¢ for Series II catalog and manual.



SpeakerKit Box 12A, Route 2, Menomonie, WI 54751

**FOR SALE**

**COLORADO AND WYOMING!** The area's finest specialty audio store. Grado, Winn Labs, Promethean, Supex, Connoisseur, Denon, J.A. Mitchell, Grace, Hadcock; Rogers BBC Monitors, J R 149, Allison, Shahinian, Spatial, Grafyx. Demonstrations, sales by appointment. Audio Alternative, Fort Collins, Colorado. Mail order inquiries promptly answered. (303) 221-1496, Call 9-5. 1-9

**CONNECTICUT:** ADC-Accutrac, Advent, Audio Pulse, B&O, B.I.C., Citation, Dahlquist, Epicure, Harman/Kardon, J.B.L., Mitsubishi, Nakamichi, Ortofon, Phase Linear, Sony, Stax, Tandberg, Yamaha, Cizek, Sonus. Will ship prepaid. Sounds Incredible, 226 White St., Danbury, Conn., 06810. (203) 748-3889—phone quotes only. TF

**CROWN CX-822** tape deck. Line inputs. Includes tape counter and case. Mint condition. \$1200/offer. L Rose, Rt. 2, Box 33, Smith, Nevada, 89430.

**CROWN D150A AMP** IC150 preamp. Mint, original boxes. manuals \$595 both. Walnut cases. \$50. (801) 486-6285

**CSA AUDIO**

Contemporary Sound Associates

New Jersey's audio alternative featuring BEVERIDGE 2SW-1; DAYTON-WRIGHT; JR; LUXMAN; STAX; VAN ALSTINE; LINN SONDEK; DB SYSTEMS; SUPEX; ADC; 3a; CAMBRIDGE; AUDIO TECHNOLOGY; SOUND CONCEPT; FRIED; GRACE; WINTEC; CIZEK; DENON; CONNOISSEUR; SONUS; DECCA & JH. CSA catalogue now available. Stop in or call now. CSA Audio 35 Littlefalls Road Fairfield NJ 07006 (201) 575-1135. 12-8

**CUSTOMIZED TAPES,** Jazz, Big-Band. Over 500 standard tracks. 80 minute cassettes or 8-tracks. \$8.00. Open reel, \$10.00, catalog \$1.00 (refundable). Tapes Unlimited Box 163 Portsmouth RI 02871 T.F.

**ACCUPHASE P-300** \$450. Soundcraftsmen PE 2217 \$275. Trevor Lees preamp, latest mods \$175, Trevor Lees high level gain stage \$95. all excellent condition. (707) 938-1131.

**WOOFERS • MIDRANGES • TWEETER  
ZERO PHASE ERROR CROSSOVERS**

High power handling 4 1/2" & 5 1/4" midrange units with 2.7 lb. magnet structures • One hundred watt 6", 8", 10" & 12" woofers with 4.7 lb. or 7.6 lb. magnet structures • High quality 1" cloth dome tweeter with 3 lb. magnet structure • Wide dispersion, low distortion piezoelectric tweeter handling 150 watts r.m.s. • Revolutionary new ZERO PHASE ERROR CROSSOVER built on glass epoxy printed circuit boards for 2, 3 & 4-way systems • Crossovers are matched to system utilizing our drivers or systems utilizing the high quality POLYDAX units mfg. by AUDAX in France • Large inventory of nonpolar capacitors, non-inductive wire wound resistors & air-core coils.

SEND \$3.00 for prices & CATALOG of complete engineering data, application notes and simplified procedures for measuring Theile and Small's parameters — refundable with first order.

EMS, Inc. • P. O. Box 5301 • Knoxville, TN 37918

**FOR SALE**

**ACOUSTECH TEN ELECTROSTATIC** speakers 6' x 2' x 4". Orig. \$1800. Perfect condition. \$650. 212-377-7282. 11-8

**AFFORDABLE MUSICALITY** Advent 300 Rabro ST07 w/ extras, XLM MKII. FMI 80's. System \$650 or \$225 ea. 914-423-2456.

**AMPEX TAPE—NEW 1800** on 7" reel 12 for \$18 POSTPAID, 1200' 12 for \$13 POSTPAID—free list—WIDE RESPONSE. 6114A, SANTA MONICA BLVD., HOLLYWOOD, CA 90038 TF

**ANOTHER FIRST FROM PARAGON**

If you own a sub-woofer you need the System-E5 sub-woofer amp from PARAGON. Your bass can be articulate, clear and have more impact, with an amplifier specifically designed for bass. The E5 is your key to cost effective biamping because it comes in single channel modules. You buy only what you need when you need it. Single modules come in a stereo chassis for later addition of another module for use with stereo sub-woofers. Naturally, each module has its own mammoth 52 joules power supply capable of driving 2 ohm loads at full output, and naturally, it's from PARAGON. The people who lead with innovation, rather than follow with imitation. Write to me, Diana Graeber, for complete information on this exciting and innovative new amplifier. System-E5 single \$249.00, System-E5 dual \$449.00 Paragon, 997 east San Carlos Ave., San Carlos, Ca 94070 8-9

• Apt-Holman Preamplifier • Hafner Preamplifier • Dahlquist • Satin • Chartwell • Signet • Nakamichi • McIntosh • IMF • B & W • Crown • Quad • Bryston • Revox • Lux • Verion • Audio Consultants, Inc., 517 Davis Street, Evanston, Il. 60201, (312) 864-9565  
Audio Consultants, Inc., 757 N. Milwaukee Ave., Libertyville, Il. (312) 362-5594.

Write for our monthly list of used equipment bargains.

**YES, KITS!**

Glue, Screw & Goo Your Way To The World's Finest Speakers



**JANSZEN  
Z-10  
HYBRID  
ELECTRO-  
STATIC**

**\$340** a pair SEMI-KIT  
(If Factory Assembled, \$600.)

The middle of Janszen's range of hybrid bookshelf systems with fourth generation, high power, ultra-low distortion electrostatic elements—loaded into carbon fiber based lenses for excellent dispersion and pinpoint imaging. 10" woofer with low crossover point for extended clean, taut bass. Power handling: 20-100W.

JansZen Electrostats, Dalesford Bextrene & Others from \$150 a Pair!

**FREE CATALOG**

"The Speaker Specialists"  
**Sonikit** 1173 A - 65th Street  
Oakland, CA 94608

Please send me your catalog while it's still FREE!

Name A1

Address

City State Zip

## FOR SALE

### THE TUBE vs TRANSISTOR ISSUE IS DEAD!

QEI of Syracuse NY has put this overworked argument to rest with the introduction of the long awaited Model CP-1 preamplifier. The non-negotiable demands of both sides have been met in the all class A, all solid state CP-1. We will not add fuel to the fire by rehashing the respective merits of the two devices, as we believe that either device used properly is capable of far better sonic performance than is commonly achieved. Rather, the sonic success of the CP-1 stems from a thorough understanding of basic electrical principles fastidiously applied in this case to solid state devices.

Never having believed in magic, designer Clifford Kent set to work over 5 years ago to define the important basic similarities among the best audio circuits of the day. Three years later he announced to the rest of us at QEI that he had isolated a general, single common denominator that left no mystery as to why certain designs were successful, while others that might have looked promising were not. After exploring the myriad of corollaries implied by this common denominator, QEI developed a comprehensive general design theory that would apply to any audio circuit, be it tube or solid state.

Over the next two years, the theory was verified by testing and retesting, and was employed to its logical extreme in the CP-1 preamplifier. The CP-1 is the most convincing verification of the theory we can offer; it being our representation of the ideals that purist audiophiles continually express. The sound defies the usual "tube" or "transistor" characterizations, being sweet and open yet with uncanny definition and impact top to bottom. Packaging is simple and sturdy yet elegant in its simplicity. Sparing of the needless embellishments and cost effective use of premium quality parts allowed us to retain another much called for virtue, that is honest value at a reasonable price.

Call or write for information and dealer list for the CP-1. It just may be the common denominator you've been listening and looking for. Dealer inquiries invited.

QEI (315) 446-8315  
300 Audubon Parkway # 80  
Syracuse, N.Y. 13224

**THOUSANDS OF LIKE NEW LP's** and prerecorded tapes. Catalogue—\$1.50. House of Records, Hillburn, New York 10931. TF

### TIME-DELAY-SYSTEMS

Analog and digital. Low Prices! Efficient, Personalized Service. Buy with confidence! Audio American, Box 445A, Lexington Park, Maryland 20653. (301) 862-3088

**TONEARMS-CARTRIDGES-TURNABLES** at lowest prices. Most brands available, including MC cartridges. Other quality brands available. Send = 10 SASE for quotes. Audio Unlimited, 401 Reynolds Circle # 12-D, San Jose, CA 95112 (408) 289-8875 1-6 M-F. 5-9

**TOURING SOUND SYSTEMS, 2, 4 and 8 Track Studios.** Disco Sound, Cerwin Vega BGW, Altec, Shure, AKG, Tapco, Dyna, Revox, EV, Beyer, Cetec, etc. K & L Sound Service, 75 North Beacon At., Watertown, Mass. 02172. (617) 787-4072. Att: Ken Berger. TF

**TUBES - GENALEX, TELEFUNKEN, VALVO** for audiophiles who demand premium quality European replacements for ARC, Dyna, Marantz, McIntosh and other preamps, amps, & tuners.

Just a few popular types include:

	Matched Pns.	Each
GENALEX: KT88/6550	\$67.00	\$29.50
TELEFUNKEN: ECC83/12AX7		\$4.95
ECC82/12AU7		4.95
EL34/6CA7	\$23.95	10.95
VALVO: ECC83/12AX7		\$4.95
GZ34/5AR4		7.95

Tube price lists are not available due to frequent stock/price changes. Quotes provided on request for other than advertised tubes. Save 10% and get a complete Retube Kit for and specific unit.

Now! HARTLEY 8", 10", 18", 24", drivers and complete systems. Send orders and inquiries to: SOUND SERVICES, Lake Walton Road, Wappingers Falls, NY, 12590. Telephone: 914-226-5414.

## FOR SALE

**TOP QUALITY SPEAKER CABLES** with banana plugs. 25 ft. only \$24.95. "SNAKE CABLES" P.O. Box 242 Little Rock, CA 93543. 1-9

### ULTIMATE REFERENCE COMPONENTS: UPDATE

At Audio one, we are proud to present a new standard in electronics:

#### THE SPATIAL COHERENCE PREAMPLIFIER

Designer Richard Knapp, has developed a new amplification process utilizing the TFET-Valve (also developed by Mr. Knapp). The sonic result of which, reaches a new frontier of reproduction quality. In particular, the spatial relationships (e.g. depth, localization, etc.) and musical timbres are reproduced with a degree of realism that is absolutely astonishing! The Spatial Coherence preamplifier will make a MAJOR sonic improvement in ANY system regardless of the preamplifier currently used. One audition will spoil you for anything else. The way the information from disc is suspended in space, the retrieval of ambience, the dynamic range, the correctness of timbre and the incredible definition are all parameters that you will hear for the first time on the Spatial. Literature and technical details of this new technology are available and a backlog of orders has already begun. We suggest you contact us immediately for further information.

\*\*\*\*\*

We have a rash of new and exciting products for the audiophile: From Britain, the Tangent loudspeakers ranging from \$99.95 to \$499.95, featuring bextrene cones and time corrected crossovers. The superb Armstrong 602 speaker in mirror-imaged rosewood pairs. The first table to sonically surpass the Linn, the STD 305D. From America, the time and pulse aligned MZ Mod 3 speakers. Audionics new belt drive turntable (we have excellent delivery on Audionics CC-2 amplifiers). The Prometheus Phase II A cartridge. Additionally, we have a new reference speaker cable. The Lenco-clean "wet" record playing system that doubles both record and stylus life, for \$24.95! The Stylift. The Grace 707 mkII tonearm. Our incredible selection of direct and reference discs (well over 50 titles) and much more. When it comes to musical accuracy, Audio one is not just another alternative. Audio one... is the answer!

## AUDIO ONE

167 N. Woodward Birmingham, MI 48011 (313) 646-6666

**USED EQUIPT.** McIntosh MR67 \$275 C11 \$250 MC240 \$300 MC30 \$120 H.K. Cit'n Eleven \$175 Soundcraft RP2212 \$175 Marantz 140 \$190 Teac AN180 \$175 Fisher TX1000 \$140 Test Equip Hewlett Packard 200AB \$100 200CD \$125 201C \$125 330B \$175 302A \$400 310A \$500 UTC A20 Trans \$12 Ea Jack Panel \$2800 Ea T. Stack 517 E. Wildie Phila. 19125

**VACUUM TUBE ELECTRONICS:** Modifications & Restorations. Triode Lab. 313-661-6009. Write: Box 7717 Ann Arbor, MI, 48107. 12-8

### VACUUM TUBES

and tube-peculiar parts. We offer a complete inventory of high voltage capacitors, precision resistors and tubes. Kits or separate parts available for building circuitries described in our 220 + page Audio Modification Manual. Write for parts list and literature, AUDIO DIMENSIONS, 8898 Clairemont Mesa Blvd., San Diego, Calif. 92123. 12-9

**1978 AUDIO EQUIPMENT PROFILES** has just been published by AUDIO magazine. Order a copy by sending \$3.95 to: AUDIO EQUIPMENT PROFILES, 401 N. Broad St., Philadelphia, PA 19108. Over 50 pages of equipment specifications and nearly 100 pages of test reports. Supply is limited, so order now.

**24 Channel Sound Reinforcement Mixer**, 100 foot snake, balanced input, 3 band EQ submixers, monitor, echo, solo... includes UREI Model 527A graphic equalizer. Must sell! Asking Price: \$2,950.00 B C & G Enterprises, P.O. Box 708, Arvada, Colorado 80001. (303) 751-5991 or (303) 42406151. 1-9

**WANTED: PAIR ALTEC 100A** Bass engineers. Write: R.V. Marchbank, 1626 East 56th St., Tulsa, OK. 74105.

**!!!WEST CENTRAL PENNA.!!!** Denon-Audionics-SAE QED-DCM time windows-Polk-RTJR-Jim Rogers-RH labs-Onkyo. For those who know, need we say more? PRO AUDIO, 1226 Graham Ave. Windber, Pa. 15963. (814) 467-4433. 12-8

## FOR SALE

**WHAT COSTS LESS** than a direct-to-disc recording, is more fun, plays longer, and never wears out? The Hi-Fi Game! Immediate delivery. \$11.95 to Penijon Games, Box 2129, Martinez, CA 94553. 8-9

**WHOLESALE AUDIO ACCESSORIES-** Cassette, 8 tracks, record players, Needles, Patch Cords, Plugs. Free Catalog—\$3 minimum order. PRB Corp., Box 176, Whitewater, Wisconsin 53190 1-414-473-2151

**WISCONSIN HAS;** Audionics, Derion, Luxman, Hafler, Polk, Soundcable, Mayware, STAX, Mirco-Acoustics, Infinity, Connoisseur, Lit. and prices on request: The Sound Seller, 1706 Main St., Marinette, WI 54143. 715-735-9002. 1-9

### WORLD AUDIO WESTCHESTER, INC.

Westchester's finest audio sales and service dealer is proud to announce the addition of:

#### Celestion Speaker Systems

to the already fine lines of Lux, Soundcraftsmen, Thorens, Audio-technica, ADC-BSR, AR, AKG, CM LABS, DBX, DECCA, JVC, Jensen, M.A., Optonica, Phillips, Pickering, Pioneer, Stanton, Supex, Sonab, Tandberg. Direct to disc records. Shipping is free in continental U.S.

#### WORLD AUDIO WESTCHESTER, INC.

211 North Avenue  
New Rochelle, NY 10801  
914-576-3230 1-9

**YAMAHA RECEIVER, CR800** built in noise reduction on phono & FM. mint \$375 (215) 843-2376. 12-8

## ZERO NEGATIVE FEEDBACK

is now possible for you to devote your favorite speaker system with electronics that do not require the crutch of negative feedback. The RAPPAPORT PRE-2NF preamplifier uses no feedback in either phono or high level amplifiers. The RAPPAPORT AMP-1 power amplifier is a class A design which slews at over 700 v/us without the use of any negative feedback. Audition the RAPPAPORT zero feedback electronics exclusively in New York at

## AMERICAN AUDIOPHILE

5 SUNRISE PLAZA  
VALLEY STREAM, N.Y. 11581  
FOR APPT: 516/561-7114

## RECORDING

**MINI-STUDIO PACKAGE SYSTEMS FROM \$2599.** Using Pro-Recording equipment from Revox, Otari, Lamb Labs, Trident Beyer. Write for full details of offer to ENTERTAINMENT SOUND SERVICES, INC., 78 N. Franklin St., Hempstead, NY 11550. (516) 538-2220. 1-9

**REVOX MODIFICATION** variable pitch for A-77. In-Sync for A-77 or A-700. Programmer for A-77. Rack Mounts, Slow Speed, 1 1/2 Full Track, Auto Rewind, High Speed 15 IPS for A-77. Sidelmatic for A-77. Machines available with or without mods at low cost (A-77 from \$695). All mods professionally performed by Revox trained technicians. ENTERTAINMENT SOUND SERVICES, INC., 78 N. Franklin St. Hempstead, NY 11550 (516) 538-2220. 1-9

## RECORDS

**DIRECT TO DISC RECORDINGS:** All labels including Sheffield, Crystal Clear, M&K, Umbrella. Send \$1.00 for catalog. Disconnection, 4201 Jetton Ave., Tampa, FL 33609. TF

**FILM-STAGE SOUNDTRACKS!** many rarities. Over 1,000 listings! Box 557342, Miami, Fla. 33155. 12-8

**JIMMY'S RARE RECORDS/** Buy & Sell Busy Flea Market/Sunnyside /Queens 43rd Ave. 784/9040 4-9

**FREE** details **A DIFFERENT KIND OF RECORD CLUB**

Discounts up to 73%, no "agree-to-purchase" obligations. All labels, Schwann catalog of thousands of titles; classical, pop, jazz, country, etc. Discount dividend certificates. Newsletter; accessories; quick service. 100% iron-clad guarantees. Write for free details.

**DISCOUNT MUSIC CLUB, INC.** DEPT. 14-1278  
650 Main Street, New Rochelle, N.Y. 10801

## RECORDS

**FREE SOUNDTRACKS & CASTS CATALOG!** Personalities! ST/OC Valuebook: \$4. RTSA 711 W. 17th G-1 Costa Mesa, CA 92627. TF

**MILWAUKEE!** — The Audio Emporium-Audio Perfectionist Cables, Audio Research, Bang & Olufsen, Connoisseur, Dahlquist, Decca, Genesis, Grace, Grado, Grafyx, Great American Sound, Hafler, Kenwood Pro, Linn, Lux Magnepan, Polk, Revox, Rogers, Sonus, Supex, Technics, many direct discs, 6900 W. Brown Deer Rd., Open Tues. thru Sat. 10-6. 414-354.5082. tf

**NOTICE: RECORD RATERS WANTED** (No experience required) Each month you will receive nationally released albums to rate. THERE IS NO EXTRA CHARGE for the LP's you receive. You pay a small membership fee which covers all costs of the LP's. We pay postage. In return for your opinion, build your LP collection. "First come basis." For application write: EARS, DEPT. AD Box 10245, 5521 Center St., Milwaukee, WI 53210.

**OLDIES 45's. ORIGINAL ARTISTS.** Free discount catalog. National Hit: Box 346- Utica N.Y. 13503. 12-8

**RARE OUT-OF-PRINT LP's.** Factory Sealed — 99¢ to \$3.99 ea. Over 25,000 in stock. List — \$1.00 Record Warehouse, Box 4617, Dept. AO, Rochester, New York 14613.

**RARE OUT-OF-PRINT LP's.** Factory Sealed — 99¢ to \$3.99 ea. Over 25,000 in stock. List — \$1.00 Record Warehouse, Box 4617, Dept. AO, Rochester, New York 14613.

**"RECORD JACKETS.** Replace old, torn, LP jackets with clean, glossy, pure white or black jackets. Plastic lined inner sleeves, 78 sleeves, opera boxes. Free catalog. CABCO A6, Box 8212, Columbus, Ohio 43201." TF

### RECORDS, RECORDS, RECORDS

Old, New & Direct Disc too! Send \$1. for Complete Info. S.E.O.J., 519 Wheat, Johnstown, PA 15902. 4-9

**SOUNDTRACKS — JAZZ — POP.** Vincent, Box 5202, Long Island City, NY 11105. A

**WORLD'S LARGEST,** computerized, catalogue of rare records, 18,000 entries. Classical, Showbiz, Popular, Jazz, Comedy, Spoken. \$2.50 refundable. Round Sound West, P.O. Box 2248 Leucadia, CA 92024. 1-9

## SPEAKERS

**HIGH FIDELITY SPEAKERS REPAIRED  
AMPRITE SPEAKERS SERVICE  
655 Sixth Avenue, New York, N.Y. 10010  
212-CH3-4812**

TF

**SPEAKER REPAIR** - How to. Fully illus. step by step. No spec. tools — Voice coils, susp., cones, etc. Guar. \$3: Repair, 2860 Park St., Hono., HI 96817. 12-8

## WANTED TO BUY OR TRADE

**CASH FOR** your unwanted LPs & reel to reel tapes. Records, Box 323, Hillburn, New York 10931. TF

**JBL SG-520, SE400S, SE460.** State Price condition. P.O. Box 962, Hollywood, CA 90028. 213-851-1107 1-9

**MATANTZ 7C, 9,** McIntosh C22, Mc275. State price and condition. J. Fong, 1238 Green St., San Francisco, CA 94010 (415) 572-1812 10-9

**OPEN REEL** pre-recorded tapes. Rock, folk, jazz, classical stereo, quad (8-track quad also). A few of each for sale too. SSAE, Ray, 1293 French Ave., Lakewood, Ohio 44107. 11-9

**Used vacuum tube Electronics,** classic speakers and esoteric products. State price and condition. Sound Advice Box 782 Brookline Village, MA 03247. Tel. 617-734-2727 1-9

**WANTED:** Electra voice Patrician IV's or parts. Call J.W. (616) 895-7914. 12-8

## WANTED TO BUY OR TRADE

**WANTED - Harman Kardon citation "B"** amplifier working or not. Greg, 788 Cdooni Ave. Modesto, Calif. 95351.

**WANTED: PAIR ALTEC 100A** Bass energizers. Write: R. V. Marchbank, 1626 East 54th St., Tulsa, OK 74105.

**WANTED: Realistic STA180** stereo receiver. Call collect 212-438-5714 evenings. Call Arnie. 12-8

**WANTED: Recording gear** of all ages and variety. Microphones, outboard gear, etc. Dan Alexander, 6026 Bernhard, Richmond, CA 94805. (415) 232-7933.

**WESTERN ELECTRIC 594A** Driver. 21 Holly Hill Dr. WA98040. 1-9

## PLANS & KITS

**FM-1, FM-3 FANS:** Phase Locked Loop Multiplex Demodulator-center channel Meter Kit featuring the LM1800AN (THD 0.1%) Demodulator and custom made Meter is now available for \$29.95 post paid.

**LT-110 FANS:** Same as above but without meter plus separate instruction sheet for \$22.50. Send for free info. VSM Audio P.O. Box 114, Maspeth, NY 11378.

**LOW TIM PREAMP AND POWERAMP KITS OR ASSEMBLED.** Free 30-page manual. Write Moonlighter Electronics, 117 Inverness, San Francisco, CA 94132 (415) 664-6703. 10-9

**TAPE-SLIDE SYNCHRONIZER,** multiprojector lap-dissolve plans. \$5.50. With mixer, compressor, preamp schematics, \$8.50. The Millers, 1896 Maywood, S. Euclid, OH 44121. TF

## BUSINESS OPPORTUNITIES

**AUDIO/STEREO SHOP** Mid-Atlantic University Town Well established - good growth. Potential for promotion minded investor or working partner. Reply Box # A812-1 Audio.

**CABLE FM BROADCAST STATION.** Unique no investment/experience business makes money! Others work for you! Free details. "CAFM", Box 5516-N9, Walnut Creek, CA 94596 TF

**CAMPUS REPRESENTATIVES** - Earn big money as a QSI Campus Rep! For info, contact **QUADRAPHONIC STUDIOS INTERNATIONAL, 4151 Emerson St., Skokie, IL 60076.**

**EARN \$500.00/THOUSAND IMMEDIATELY STUFFING ENVELOPES!** FREE DETAILS: MONTEREY PLACE P.O. Box 33147-CI, Coon Rapids, Minn. 55433. 4-9

**EXCEPTIONAL PROFITS.** Must know electronics. Send \$2.00 (or business letterhead). Box 809, Boyton Beach, Fla. 33435. 2-9

**OWN AN OIL WELL.** Official U.S. Government Lottery. \$25 is total investment - may win immediate \$10,000 to \$200,000. Beautiful odds. Send \$1 for package. U.S. Natural Resources, Box 11370A, Chicago 60611.

## HELP WANTED

**OVERSEAS JOBS** — Now hiring all Occupations. High pay. Transportation. Computerized Reports. \$2.00 TRANSWORLD, International Airport, Box 90802-K, Los Angeles 90009 TF

**WE NEED REPS.** to sell Audio/Visual gear at lower prices and more money — Wholesale Audio Distributors. Box 707 Dept. NW Amherst Mass. 01002. 12-8

## MUSICAL INSTRUMENTS

**UP TO 60% DISCOUNT.** Name brand instruments. Catalog Freeport Music, 114R Mahan St., W. Babylon, N.Y. 11704. TF

## RADIO PROGRAMS

**CATALOGS.** Broadcasts, soundtracks. Personalities of Thirties. Forties. Box 225, New York, N.Y. 10028. TF

## RADIO PROGRAMS

**RENT RADIO SHOWS:** Make your own copies or just listen. Great way to build your collection reasonably. Catalog \$1 refundable. OTR Rental, Box 1146, Livermore, Ca. 94550 TF

**VINTAGE RADIO:** Lowest rates. post free. Traders welcome. Also trading for comics, films, pulps, etc., video tapes, too. SIGNALS, Box 5063, Sta. E. Edmonton, Alta., CANADA. 3-9

**WHILE YOU WERE LOOKING** for out-of-print records, you should've been looking for us. DISContinued. 444 S. Victory Blvd., Burbank, Ca. 91502 TF

**YESTERDAYS RADIO ON TAPE.** Reels-Cassettes. Quality Sound. Reliable Service. Catalog \$1.00 refundable with first order. ADVENTURES, Box 4822-A, Inglewood, California 90302. TF

**1930-1962 RADIO PROGRAMS.** Beats television!! Tapes. \$1.00 hour! Established esteemed dealer, informative 200 page catalog \$1.25. Cassette samples \$2.00. AM Treasures, Box 192AU, Babylon, N.Y. 11702 TF

## INSTRUCTION & EDUCATION

**CLASSES IN MUSIC RECORDING.** Record Production, publishing, disc mastering, film recording. Taught by famous engineers and producers. Held in 16/24 track recording studios. Contact: University of Sound Arts, 1508 Crossroads of the World, Hollywood, CA 90028. (213) 467-5256. 3-9

**GET INTO BROADCASTING!** Learn how to receive free records, tapes, get an FCC broadcast license, start your own station. Free details. "Broadcasting", Box 5516-N9, Walnut Creek, CA 94596 TF

### "INSIDE TRACK" ON MUSIC INDUSTRY

Stevie Wonder, Fleetwood Mac, Olivia, record executives tell how they made it, how you can too. Hour record, \$4.98. Box 85502, L.A. 90072. 12-8

### NEW

#### AUDIO MODIFICATION MANUAL

Everything you need to know to modify your equipment. Use it to its best advantage, and let it help you select components for your system. More than 220 pages of valuable information, with emphasis on vacuum tube circuitry. Step-by-step procedures for many common components. Strongly recommended by experts for both the amateur kitbuilder and the advanced audiophile. Proprietary modifications presented in detail. This unique book provides information available nowhere else. Purchase includes one year's free consultation service. \$25 U.S.A., \$27 other countries. California residents add \$1.50 tax. Telephone orders accepted (M/C, Visa): (714) 278-3310. **AUDIO DIMENSIONS.** 8898 Clairemont Mesa Blvd. San Diego, Calif. 92123. tf

## HIGH FIDELITY

**UNZOO OBFASCATION OF SALON AUDIO.** STATE-OF-THE-ART: PHASELIN-EAR II, ANALOG, TECHNICS PRO, NAKAMI, CHI, KENWOOD PURIST, PSE, NIKKO, PRO DENON, RTR, MARK LEVINSON, VAN ALSTINE, DYNA, TANDBERG, KIRKSAETER, LECSON, OTHERS: ADS, BOSE, B & O, MCINTOSH, KLIPSCH, AUDIO PULSE, BRYSTON, THRESHOLD, DAHLQUIST, KEF, SAE, YAMAHA, LUX, AND OVER 141 MORE. INCREDIBLE DISCOUNTS. PROFESSIONAL ENGINEER AVAILABLE TO GIVE FREE, NO B.S. ADVICE AND INFORMATION. SEND \$3.00 FOR NEW 17½ PAGE CATALOG CONTAINING 2,500 HIGH-END AUDIO ITEMS: EVALUATED: G.E.A./E., P.O.B. 296 (DEPT: A.), IDAHO SPRINGS, COLORADO, 80452. OR CALL: (303) 582-5200, 1:00 p.m. until 9:00 p.m. (MST) **GOLDEN EAR AUDIO/ELECTRONICS** ACCEPTS: MC, VISA, BANK, CHECKS, TRADE-INS AND HOME TRIALS.

## TAPE AND TAPE RECORDERS

**NAME-BRAND RECORDING TAPE,** custom loaded. Available in cassettes, reels, cartridges. Huge savings direct from manufacturer. Also low everyday prices on Maxell, TDK, Ampex, Scotch, BASF, etc. New catalogue now available. MJS, 2514 Seaboard Ave., San Jose, CA 95131. (408) 262-8793. 12-8

## TAPE AND TAPE RECORDERS

# TAPE DISCOUNTS

Minimum order 10 tapes



### CASSETTES

TDK-DC-45	1.00
TDK-DC-60	1.29
TDK-DC-90	1.69
TDK-DC-180	2.99
TDK-SAC-60	1.99
TDK-SAC-90	2.99
TDK-ADC-60	1.79
TDK-ADC-90	2.89

### B-TRACK

TDK-45 D 8tk	1.59
TDK-90 D 8tk	1.99
TDK-45 AD 8tk	2.29
TDK-90 AD 8tk	2.99

### OPEN REEL

TDK-L 1800	5.29
TDK-S 1800	4.29



# maxell

### CASSETTES

UDXL I OR II C-60	2.99
UDXL I OR II C-90	3.99
UDC-46	1.99
UDC-60	2.49
UDC-90	2.99
LNC-46	1.29
LNC-60	1.49
LNC-90	2.39
LNC-120	3.29

**OUR BRAND! C-90 CASSETTES, 3 for \$1.59!**  
40 Min 8TR CART. - 99¢ ea.

**LIFETIME PRODUCT GUARANTEE!**

**ORDER NOW!** Orders shipped within 1-3 days  
Please add \$2.00 for shipping and handling per  
order. N.Y.S. Res. add sales tax. **NO C.O.D.'s**  
**FREE CATALOG!**

## CONSUMERS CO

P.O. Box 550 Dept. PO-111  
Mt. Vernon, N.Y. 10551 Phone (914) 664-2909

**BARGAINS! RECORDS, TAPES:** blank, prerecorded. Close-out prices! Catalog \$1.00 (refundable). Tower, Box 12, Lewes, Del. 19958. 7-9

**FREE PROFESSIONAL CASSETTE** w/specs. Save direct-air-mail. Discover LARKSONG, Box 468F, Point Arena, CA 95468

**LOWEST PRICES ON MAXELL, BASF, TDK, FUJI TAPES!!!**  
Send = 10 SASE for free catalog. All new, guaranteed!! Audio Unlimited, 401 Reynolds Circle = 12-E, San Jose, CA 95112

**MXR's 10 Band equalizer, Dynamic processor, Comander.** Disc-washer products. Maxell tape discounted. N.A.B. AUDIO, Box 7, Ottawa, IL 61350. 4-9

**OLDIES TAPES ON OPEN REEL TAPE.** Rock n' Roll songs by their year of release. Over 100 songs per year. Free brochure. Rock N' Reel Rental, Dept. C, 4 Prescott Ave., Dix Hills, NY 11746. 3-9

**SCOTCH RECORDING TAPE,** lowest prices **TAPE CENTER** Box 4305B Washington, D.C. 20012. USA, APO, FPO 5-9

**TDK, MAXELL, MEMOREX, BASF,** cassettes, reels 8-tracks. Lowest prices. New, Guaranteed. **FREE CATALOG** S&S Audio, P.O. Box 56039, Harwood Hts., IL 60656 TF

### BLANK TAPE SALE

**MAXELL RECORDING PRODUCTS:** Lowest prices on complete line of Maxell's quality products. Write or call for prices.

TDK SA-C60	\$2.07	Ampeg Grandmaster-C60	\$2.19
TDK SA-C90	2.99	Ampeg Grandmaster-C90	2.75
TDK AD-C90	2.49	BASF Studio or CR0-C90	2.49
Scotch Master I-C90	2.79	BASF Prof. I-C90	2.79
Scotch Master II or III-C90	3.24	BASF Prof. II or III-C90	2.95

Minimum order 12 pieces. All tapes can be assorted. PA add sales tax. Shipping \$2.50 per order. Or write for complete catalog. 412-283-8621.

Tape World, 220 Spring St., Butler, PA 16001.

## TAPE AND TAPE RECORDERS

**SAVE up to 60% BY MAIL on:** SCOTCH, TDK, BASF, MAXELL, MEMOREX, CAPITOL MUSIC TAPE, CERTRON (over 180 different reel & cassette tapes to choose from); top brand recorders; America's largest collection of taping accessories, too. Same day service. **FREE catalog.**

America's Recording Tape Specialists

## SAXITONE TAPE SALES

1776 a Columbia Rd., Washington, D.C. 20009  
(202) 462-0800

## SERVICES

**NASHVILLE RECORD PRODUCTIONS** WILL PRESS HIGH QUALITY PURE VINYL RECORDS FROM YOUR TAPES. SEND FOR SAMPLE RECORD AND PRICE LIST. ALSO FINEST DISC MASTERING. 469 Chestnut St., NASHVILLE TENNESSEE 37203 TF

**PRO-SOUND ASSOCIATES** Professional Sound reinforcement, top of line equipment only. Use for our installations. (Professional only) Call Pro Sound Associates, 44 Trinity Place, New York, NY 10006 Toll free (800) 221-3235. (212) 747-0600. 12-8

**TAPE HEAD REFINISHING** — Precision method restores full frequency response, \$15.00 ea. One day service. E. Maher, 5 Evans Place, Orinda, CA 94563. TF

**TAPE RECORDER HEADS RE-LAPPED, LATEST TECHNOLOGY.** Diamond polish used exclusively. Heads 100% tested. \$15 ea. 3 for \$40. Alignment instructions included. COLLEN ENGINEERING CO. BOX 2271, CANOGA PARK, CA 91306.

**WALNUT CABINETS** BUILT FOR YOUR STEREO COMPONENT. FOR PRICE, SEND SKETCH AND DIMENSIONS OF REQUIRED ENCLOSURE TO GEOMETRIX, BOX 612, MEXICO, MO. 65265 1-9

## MISCELLANEOUS

**ADVANCED TITLES/DEGREES,** Ministers, Honorary Doctorates, other Services available. Omnidenominational. Free Details. Acquarian Church, 432-D PCH, Hermosa Beach, California 90254. TF

**CUSTOM LABELS** Printed to order. Send ideas we will submit suggestions. P.O. Box 73 Sarasota, Fl. 33578 1-9

**ELECTRONIC BARGAINS, CLOSEOUT, SURPLUS!** Parts, equipment, stereo, industrial, educational. Amazing values! Fascinating items unavailable in stores or catalogs anywhere! Unusual FREE catalog. ETCO-008, Box 762, Plattsburgh, N.Y. 12901 TF

**FOR SALE OR TRADE** — Trained coon hounds, also started hounds sold here. Glen & Bill Fiscus, Rt. 1, Gosport Ind. 47433. Phone 812-899-4973 12-8

**JEEPS — \$59.30!! CARS — \$33.50!! 450,000 Items!** — Government Surplus — Most comprehensive directory available tells how, where to buy — Your Area! — \$2.00 — Moneyback Guarantee — Government Information Services, Department SA-12, Box 99249, San Francisco, CA 94109 2-9

### YELLOW PAGES OF AUDIO—\$3.95

Sourcebook to 1,100 periodicals, 250 books, 7,500 products! Future Publications, 137 Valley Park S. Bethlehem, PA 18018 1-9

**50 DIFF. OLD U.S. Stamps** between 1861 and 1939 \$1.00. Ed Roush, 423 Shepard, Mansfield, OH 44907. tf

## SERVICES

**CUSTOM RECORDING SERVICE,** Tapes, discs, and cassettes. Stereo and mono. Live and copies. Editing. Masters and pressings. High quality at reasonable rates. Joseph Giovannelli, Audio-Tech Laboratories, 2819 Newkirk Ave., Brooklyn, N.Y. IN9-7134 TF

# read true peak dBm and watts

Measure the peak level of complex audio signals and accurately display line level or amplifier power with the Model 510 peak responding LED display.

The rapidly changing nature of music requires a peak responding device to detect signals that can drive amplifiers into clipping or saturate tape.

The 510's patented circuitry indicates these peaks faster and more precisely than any other instrument.

Compatible with all audio systems, the 510 is also available with vertical and rack mount panels.

## AUDIO TECHNOLOGY

1169 Tower Road, Schaumburg, IL 60195  
(312) 885-0066



# ANNUAL INDEX

## Subject Index

*New IHF Amplifier Standard*, Edward J. Foster, June, 24.

### Antennas

*What Kind of FM Antenna Is Best for You?* M.J. Salvati, Jan., 30.  
*Transmission Lines & Signal Distribution*, M. J. Salvati, Feb., 54.  
*Reception Problems*, M.J. Salvati, March, 36.  
*Complete Antenna Systems*, M.J. Salvati, April, 42.

### Book Reviews

*Modification Manual for Vacuum Tube Electronics*, Feb., 32.  
*The Album Cover Album*, Feb., 32.  
*John Hammond on Record*, Feb., 34.  
*Record Art Books Compared*, James Wizard Wilson, June, 70.  
*Silver Ghosts*, Aug., 103.  
*1988: The New Wave Punk Rock Explosion*, Aug., 103.  
*Acoustic Design*, Aug., 103.

### Car Stereo

*Four Car Stereos Tested*, Len Feldman, July, 48.  
*Car Stereo Directory of Manufacturers*, July, 28.  
*Car Stereo Directory*, July, 30.  
*Car Speaker Directory*, July, 36.

### Cassettes

*58 Cassettes Tested*, Howard A. Roberson, Sept., 42.  
*Performance of High-Energy Materials in Cassettes*, Peter Vogelgesang, Sept., 54.  
*Cassette Tapes Tested — An Update*. Howard A. Roberson, Dec., 71.

### Construction

*Build an Audio Phase Detector*, Charles Kitchin, Jan., 54.  
*Build a Pre-Preamp*, W. Marshall Leach, Feb., 36.  
*Build a Speaker Power Indicator*, Almon Clegg, March, 42.

*Dolby Noise Reducer*, Geoffrey Shorter, May, 78.

*Dolby Noise Reducer, Part II*, June, 114.

*Dolby Noise Reducer, Part III*, July, 82.

*Cascade Amp Design*, Nelson Pass, March, 52.

### Directories

*Annual Product Directory*, Oct.  
*Directory of Manufacturers*, Oct., 38.  
Preamplifiers, 58; Amplifiers, 68; Tuners, 78; Receivers, 86; Turntables, 96; Tonearms, 105; Phono Cartridges, 106; Cassette, 8-Track, & Elcaset Tape Decks, 114; Open-Reel Tape Decks, 122; Headphones, 126; Loudspeakers, 130; Microphones, 172, and Equalizers, 177.  
*Annual Product Directory Addenda*, Dec., 62.  
*Directory II*, Nov.  
Blank Tape, 54; Record Care Products, 62; Speaker Stands, 63; Power Indicators, 68; Time Delay & Ambience Generation Systems, 68; Recorder Care Products, 72; Noise Reduction & Filter Systems, 76; Switching Systems, 80; Component Racks, 84, and *Directory of Manufacturers*, 88.  
*Car Stereo Manufacturers Directory*, July, 28.  
*Car Radio/Tape Player Directory*, July, 30.  
*Car Speaker Directory*, July, 36.  
*Car Stereo Directory Addenda*, Dec., 68.  
*Disco Scene '78*, Stephen Traiman, June, 64.

### Dolby

*Build A Dolby Noise Reducer*, Geoffrey Shorter, May, 78.  
*Build a Dolby Noise Reducer, Part II*, June, 114.  
*Build a Dolby Noise Reducer, Part III*, July, 82.

### Equipment Profiles

AKG P8ES Phono Cartridge, Dec., 96.  
Ace Audio 3100 Preamplifier, April, 87.  
Acutex M320III STR Phono Cartridge, June, 112.  
Aiwa AD-6550 Cassette Deck, Dec., 100.  
Armstrong 625 Receiver, March, 78.  
Audio General 511 Preamp, June, 86.  
B&W DM-6 Speaker, Feb., 74.  
B&O M70 Speaker, May, 64.  
Beyerdynamic M500N (C) Microphone, Feb., 89.  
Big Tape Head Maintenance Kit, Nov., 112.  
Burwen DNF-1201A Noise Filter, Jan., 76.  
Cerwin-Vega Metron PR-1 Preamplifier, May, 74.  
Dual 939 Cassette Deck, April, 92.  
Garrard GT-35 Turntable, April, 90.

Hitachi SR-2004 Receiver, Nov., 92.  
JVC KD-85 Cassette Deck, Nov., 100.  
JVC QL-7 Turntable, Dec., 92.  
Jani's Audio W-1 Subwoofer, June 94.  
Kerwood KX-1030 Cassette Deck, May, 64.  
Lenco C2003 Cassette Deck, Nov., 120.  
Lirpa "VDRS" Vehicular Disc Reproduction System, April, 71.  
Lux R-1120 Receiver, Aug., 70.  
Marantz 2500 Receiver, Feb., 64.  
Marantz 5030 Cassette Deck, Dec., 84.  
McIntosh C-27 Preamplifier, Sept., 78.  
Motorola TC 887 AX Car Radio & Cassette Player and EQB-3000 Equalizer/Booster, July 51.  
Nakamichi CM-700 Microphone, Sept., 90.  
Nakamichi 730 Receiver, Dec., 74.  
Nakamichi T-100 Audio Analyzer, Nov., 128.  
Neumann fet-80 Microphone, Jan., 80.  
Onkyo A-7 Amplifier, Jan., 68.  
Optonica ST-3636 Tuner, Dec., 108.  
Panasonic CX-7100 Cassette Deck, CA-9500 Tuner, and CH-3510, Booster, July, 64.  
Pioneer SX-1980 Receiver, Sept., 70.  
Pioneer TVX-9500 TV Tuner, Nov., 108.  
Project/One Mark IVB Receiver, April, 81.  
Realistic Sound Level Meter, Nov., 119.  
Sanyo FT-1490A Car Radio-Cassette Player, July, 56.  
Satin M-18 BX Phono Cartridge, Dec., 106.  
Scott CD-87R Cassette Deck, Aug., 82.  
Shure M615AS Analyzer System, July, 92.  
Sony PS-X6 Turntable, July, 86.  
Sony TC-K711 Cassette Deck, Aug., 76.  
Sparkomatic SR-48 Car Radio & Cassette Deck, July, 50.  
Spectro Acoustics 217 Preamplifier, Feb., 86.  
Stanton 881S Phono Cartridge, Nov., 105.  
Studer-Revov B-77 Open-Reel Recorder, Sept., 84.  
Tandberg TR -2040 Receiver, June, 102.  
Technics RS-9900US Tape Deck, June, 106.  
Toshiba PC-3060 Cassette Deck, Feb., 82.  
White 4100 Equalizer, Nov., 125.  
Yamaha CR-420 Receiver, Nov., 114.

*Equivalent Mass—Fact or Fiction?*, Roger Anderson, March, 60.

*FCC's Four-Channel Listening Tests*, Alfred W. Myers, May, 24.

*FM Specifications Revisited*, Leonard Feldman, April, 58.

*Headphones—History & Measurement*, P. Milton, May, 89.

*Japan Audio Fair*, George W. Tillett, Feb., 42.

## Listening

*Recordings for Critical Listening*, Daniel Shanefield, Jan., 40.

*Headphones—History & Measurement*, P. Milton, May, 89.

## Loudspeakers

*TDS in Sound Measurements*, Don Davis, Jan., 46.

*Another Look at Crossover Networks*, Neville Thiele, Aug., 38.

*Confessions of a Loudspeaker Engineer*, W.J.J. Hoge, Aug., 47.

*Sabine Reverberation Equation and Its Offspring*, Don Davis, Aug., 56.

## Measurements

*TDS in Sound Measurements*, Don Davis, Jan., 46.

*Audio Phase Detector*, Charles Kitchin, Jan., 54.

*FM Specifications Revisited*, Leonard Feldman, April, 58.

*FCC's Four-Channel Listening Tests*, Alfred W. Myers, May, 24.

*Phono Reproduction 1978*, James H. Kogen, et al., May, 32.

*Phono Reproduction 1978, Part II*, June, 42.

*New IHF Amp Standard*, Edward J. Foster, June, 24.

*A New Standard in Turntable Speed Constancy*, George T. Gillies, Rogers C. Ritter, & Robert T. Rood, June, 78.

*The Compleat Microphone Review—An Update*, Jon Sank, Sept., 35.

*58 Cassettes Tested*, Howard A. Roberson, Sept., 42.

## Microphones

*The Compleat Microphone Review—An Update*, Jon Sank, Sept., 36.

*A Basic Guide to Coincident Microphones*, Charles P. Repka, Nov., 40.

## Music

*Recordings for Critical Listening*, Daniel Shanefield, Jan., 40.

*My Friend, The Maestro . . . Leopold Stokowski*, Bert Whyte, Jan., 58.

*George Martin*, Interview, Paul Laurence, May, 46.

*Les Paul*, Interview, Paul Laurence & Bob Rypinski, Dec., 36.

*Disco Scene '78*, Stephen Traiman, June, 64.

*Open-Reel Renaissance*, Gary R. Gruber, April, 52.

*Perils of Patchwork*, Clyde J. Schultz, March, 68.

## Personalities

*My Friend, The Maestro . . . Leopold Stokowski*, Bert Whyte, Jan., 58.

*George Martin*, Interview, Paul Laurence, May, 46.

*Tall Tales*, Joel Tall, Oct. 16.

*Les Paul*, Interview, Paul Laurence & Bob Rypinski, Dec., 36.

## Phono Cartridges

*Equivalent Mass—Fact or Fiction?*, Roger Anderson, March, 60.

*Phonograph Reproduction 1978*, James H. Kogen, et al., May, 32.

*Phono Reproduction, Part II*, James H. Kogen, et al., June, 42.

*Recordings for Critical Listening*, Daniel Shanefield, Jan., 40.

*Guide to Good Service*, Herman Burstein, July, 68.

## Standards

*FM Specifications Revisited*, Leonard Feldman, April, 58.

*New IHF Amp Standard*, Edward J. Foster, June, 24.

## Tape

*Tape Slitting & Edge Quality*, Wayne Saylor, April, 28.

*58 Cassettes Tested*, Howard A. Roberson, Sept., 42.

*Performance of High-Energy Materials in Cassettes*, Peter Vogelgesang, Sept., 54.

*A New Recording System*, Herman Lia, July, 76.

*A New Standard in Turntable Speed Constancy*, George T. Gillies, Rogers C. Ritter, & Robert T. Rood, June, 78.

# Author Index

**Anderson**, Roger, L.R. Happ, B.W. Jakobs, F.J. Karlov, James H. Kogen, and S.A. Mastricola, *Phono Reproduction 1978*, May, 32, and June, 42.

**Burstein**, Herman, *Guide to Good Service*, July, 68.

**Clegg**, Almon, *Build a Speaker Power Indicator*, March, 42.

**Davis**, Don, *TDS in Sound Measurements*, Jan., 46; *Sabine Reverberation Equation and Its Offspring*, Aug., 56.

**Feldman**, Leonard, *Four Car Stereos Tested*, July, 48; *FM Specifications Revisited*, April, 58.

**Foster**, Edward J., *New IHF Amp Standard*, June, 24.

**Gillies**, George T., Rogers C. Ritter, and Robert T. Rood, *A New Standard in Turntable Constancy*, June, 78.

**Gruber**, Gary R., *Open-Reel Renaissance*, April, 52.

**Happ**, L.R., Roger Anderson, B.W. Jakobs, F.J. Karlov, James H. Kogen, and S.A. Mastricola, *Phono Reproduction 1978*, May, 32, and June, 42.

**Heyser**, Richard C., *Alternatives*, Feb., 50; *The End Product*, March, 46.

**Hoge**, W.J.J., *Confessions of a Loudspeaker Engineer*, Aug., 47.

**Jakobs**, B.W., Roger Anderson, L.R. Happ, F.J. Karlov, James H. Kogen, and S.A. Mastricola, *Phono Reproduction 1978*, May, 32, and June, 42.

**Kitchin**, Charles, *Audio Phase Detector*, Jan., 54.

**Kogen**, James H., Roger Anderson, L.R. Happ, B.W. Jakobs, F.J. Karlov, and S.A. Mastricola, *Phono Reproduction 1978*, May, 32, and June, 42.

**Laurence**, Paul, *George Martin*, May, 46, and Bob Rypinski, *Les Paul*, Dec., 36.

**Leach**, W. Marshall, *Build a Pre-Preamp*, Feb., 36.

**Lia**, Herman, *A New Recording System*, July, 76.

**Mastricola**, S.A., Roger Anderson, L.R. Happ, B.W. Jakobs, F.J. Karlov, and James H. Kogen, *Phono Reproduction 1978*, May, 32, and June, 42.

**Milton**, P., *Headphones — History & Measurement*, May, 89.

**Myers**, Alfred W., *FCC's Four-Channel Listening Tests*, May, 24.

**Pass**, Nelson, *Cascade Amp Design*, March, 52.

**Repka**, Charles P., *A Basic Guide to Coincident Microphones*, Nov., 40.

**Ritter**, Rogers C., George T. Gillies, and Robert T. Rood, *A New Standard in Turntable Constancy*, June, 78.

**Roberson**, Howard A., *58 Cassettes Tested*, Sept., 42; *Cassette Tapes Tested — An Update*, Dec., 71.

**Rood**, Robert T., George T. Gillies, and Rogers C. Ritter, *A New Standard in Turntable Constancy*, June, 78.

**Rypinski**, Bob, and Paul Laurence, *Les Paul*, Dec., 36.

**Salvati**, M.J., *What Kind of FM Antenna Is Best for You?*, Jan., 30; *Transmission Lines & Signal Distribution*, Feb., 54; *Reception Problems*, March, 36, and *Complete Antenna Systems*, April, 42.

**Sank**, Jon, *The Compleat Microphone Review — An Update*, Sept., 35.

**Saylor**, Wayne, *Tape Slitting & Edge Quality*, April, 28.

**Schultz**, Clyde J., *Perils of Patchwork*, March, 68.

**Shanefield**, Daniel, *Recordings for Critical Listening*, Jan., 40.

**Shorter**, Geoffrey, *Dolby Noise Reducer*, May, 78.

**Tall**, Joel, *Tall Tales*, Oct., 16.

**Thiele**, Neville, *Another Look at Crossover Networks*, Aug., 38.

**Tillett**, George W., *Japan Audio Fair*, Feb., 42.

**Traiman**, Stephen, *Disco Scene '78*, June, 64.

**Vogelgesang**, Peter, *Performance of High-Energy Materials in Cassettes*, Sept., 54.

**Whyte**, Bert, *My Friend, The Maestro . . . Leopold Stokowski*, Jan., 58.

**Wilson**, James Wizard, *Record Art Books Compared*, June, 70.

# 17 MARANTZ COMPONENT WHATEVER THE MIX IT'S ALWA

Now there's a Marantz component system for everyone! From our most affordable to our finest—with 223 systems priced in between—Marantz delivers the same top Marantz quality and the same stunning Marantz look. There's never a compromise! And with so many systems to choose from, you'll be able to find the exact match for your listening requirements and budget.

## A MARANTZ EXCLUSIVE: MIXED SYSTEMS THAT REALLY MATCH.

From the least expensive to the most expensive, all Marantz Pre-Amps, Power Amps, Console Amps, Tuners and Front-Load Cassette Decks feature the same front panel size, the same striking cosmetics, the same top quality design philosophy. So whatever component combination you choose, you'll have a perfect match. Only with Marantz.

## BRINGING IT ALL TOGETHER.

Once you have selected a system, only one question



*The RM-3700 STACK RACK contains three Marantz components on fixed-positioned shelves, an accessory shelf and divided record compartment behind its full-length smoked-glass door. The Marantz system shown includes the 6170Q Turntable, 2110 Tuner, 1180DC Integrated Amplifier, 5010B Cassette Deck and Design Series 930 Speakers.*

remains: Where do you put it? With a Marantz STACK RACK you can bring it all together—with style. The RM-3100 "Professional" STACK RACK (at right) will accommodate up to four Marantz components equipped with optional rack handle adaptors. Or you may prefer the RM-3700 "Decorator" STACK RACK (above) which encloses three Marantz components behind its full-length smoked glass door. A perfect fit in either rack, your entire system will be at your fingertips.

## BUILD NOW. ADD LATER.

Once you see and hear what Marantz components have to offer by way of more performance per dollar, striking appearance and unheard of flexibility, you'll be sold. You'll have a perfectly matched system tailored to your specific needs from as little as \$650\* to \$2100\*. And don't hesitate when you want to upgrade any part of your system. Any Marantz component you upgrade to will match what you already have.

## MIX AND MATCH BY MARANTZ—IT'S ALL FOR YOU.

17 separate components from Marantz. Designed to mix and match into 225 different systems to give you unprecedented flexibility. Whoever you are, Marantz has the perfect system for you.

*The three unit Marantz system shown at right includes the 2100 Tuner, 1090 Integrated Amplifier and the 5000 Cassette Deck with 6270Q Turntable. The four unit Marantz system shown at the far right includes the 2130 Tuner, 3650 Pre-amplifier, 5030B Cassette Deck and the 300DC Amplifier with a 6370Q Turntable.*

25<sup>th</sup> Anniversary **marantz**®

\*These prices are for informational value only (actual prices are set by Marantz retail dealers) and do not include turntables, racks, optional rack handles or speakers. ©1978 Copyright Marantz Co., Inc., a subsidiary of Superscope, Inc., 20525 Nordhoff St., Chatsworth, CA 91311. All Rights Reserved.

# S. 225 MARANTZ SYSTEMS. YS A MATCH-FROM \$650\* TO \$2100.\*



# Technics

The first thing a disco DJ wants to know about a turntable is: "Can I play the hustle without the hassle of rumble." While the last thing a classical FM station wants to hear is Pablo Casals accompanied by wow and flutter. That's why so many discos and classical FM stations use Technics professional turntables.

It's also the reason you should use Technics SL-1800 manual, the SL-1700 semi-automatic or the SL-1600 automatic (shown below). Because all three models give you inaudible wow and flutter of 0.025% (WRMS) as well as inaudible rumble of -78 dB (DIN B). That's performance equal to our professional turntables and that's impressive.

How did we do it? With the Technics direct-drive motor plus our 321 element one-chip IC. The "chip" eliminates speed variations and improves accuracy with a lightning-fast circuit that automatically senses the precise speed our direct-drive system needs for accurate rotation, even under sudden loads.

Each turntable gives you low acoustic feedback even at high music levels. Because they all have Technics unique double-isolated suspension system. One suspension damps out vibration from the base, the other from the platter and tonearm.

Equally impressive is Technics computer-analyzed S-shaped universal tonearm. Its gimbal suspension reduces friction to 7 mg. while it greatly increases tracking sensitivity.

And that's not all. Technics turntables also feature oil-damped cueing. A built-in strobe. Pitch controls variable by 10%. And a detachable dust cover.

Technics. The name behind the direct-drive system FM stations use and discos abuse.

## Professional performance is something discos and radio stations get from Technics. Now you can get it too.



Enter No. 65 on Reader Service Card