

# Audio

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WORKBENCH  
—CROWN'S RTA

INTERVIEW

JIM  
METZNER  
OF  
SOUND  
IMAGES

DIRECTORY

BLANK  
TAPE,  
RECORD-  
CARE  
PRODUCTS  
& SIGNAL  
PROCESSORS

U0296146 1085 90515031P7202232  
WILLIAM M KAYSER  
147 N BAYVIEW BLVD  
NORFOLK VA 23502





# AND SO IS THE FIGHT ABOUT TUNERS.

At one time the struggle between amplifiers was won by the amp that had the most muscle. And the tuner that brought in the most stations also brought in the most acclaim.

Today, there's one series of amplifiers whose technology has put it in a class by itself. And now, with Pioneer's new TX 9800 tuner it's met its match.

While other tuners offer features that just sound great, every feature in Pioneer's TX 9800 helps to produce great sound.

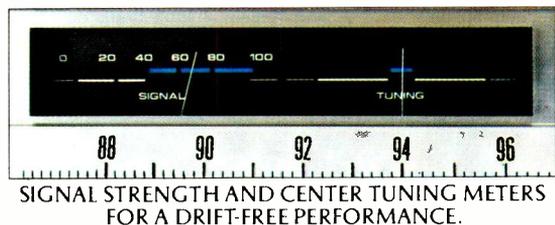
Unlike ordinary tuners that are content with ordinary circuitry, the TX 9800 has a new Quadrature Discriminator Transformer that works with Pioneer's exclusive PA 3001-A integrated circuit to reduce distortion to 0.05% at 1 KHz and raise the signal-to-noise ratio to 83 dB. Whew!

Many of today's tuners use sophisticated low pass filters to remove the 19 KHz pilot signal that's present in every stereo broadcast. But while they're effective in removing the pilot signal, they're also effective in removing some of the music.

The TX 9800 has Automatic Pilot Canceling Circuitry that makes sure every part of the music is heard all of the time. And that distortion is veritably unheard of.

The crowning achievement of most tuners today is the sensitivity of their front end. And though it's much to their credit to bring in weak stations, it means nothing unless they can do it without spurious noise or other interference.

The TX 9800's front end has three dual gate MOSFET's that work with our five gang variable capacitor to give you an FM sensitivity of 8.8 dBf. And also make sure that your favorite music is not disturbed by what's playing elsewhere on the dial.



INSTANTANEOUS FLUROSCAN METERING THAT LETS YOU WATCH EVERY PERFORMANCE WHILE YOU HEAR IT.

And while most tuners today give you one band width for all FM stations, the TX 9800 gives you two. For both AM and FM. A wide band that lets you bring in strong stations loud and clear. And a narrow one that finds even the weakest station on a crowded dial and brings it in without any interference.

All told, these scientific innovations sound mighty impressive. But they wouldn't sound like much without an even more impressive tuning system.

The TX 9800 has a specially designed Quartz Sampling Lock Tuning System, that fortunately, is a lot easier to operate than pronounce.

Simply rotate the tuning dial to your desired station. When the station is tuned exactly right a "tune" light comes on. By releasing the tuning dial you automatically lock onto that broadcast. And automatically eliminate FM drift.

By now, it must be obvious that the same thinking that went into Pioneer's new amplifiers has also gone into their new line of tuners.

So just as Pioneer ended the class struggle between amps, they won the fight between tuners. With a technical knockout.

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# THE STRUGGLE BETWEEN THE CLASSES IS OVER.

For years people have clashed over which amplifiers are best. Class A or Class B.

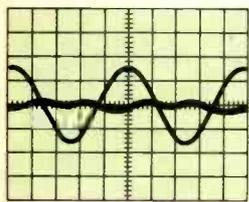
Expensive Non-switching Class A amplifiers are known to offer the lowest levels of distortion. At the same time, they also offer the highest operating temperatures.

And while Switching Class B amplifiers increase efficiency, they also increase distortion.

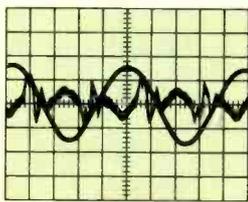
So if you're not paying through the nose for a heat-producing Class A amplifier, you'll be paying through the ear for a distortion-producing Class B.

At Pioneer, we believe most of today's Class A and Class B amplifiers are pretty much in the same class. The class below Pioneer's SA 9800.

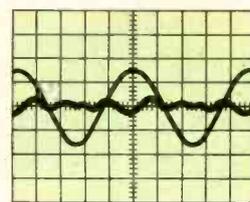
Pioneer's Non-switching SA 9800 offers the efficiency found in the finest Class B amplifiers. With a distortion level found in



CLASS A AMPLIFIER.  
LEAST DISTORTION  
BUT MOST HEAT.



CLASS B AMPLIFIER.  
MOST DISTORTION  
BUT LESS HEAT.



SA 9800.  
LESS DISTORTION, LESS  
HEAT, AND MORE POWER.

the finest Class A. An unheard of 0.005% at 10-20,000 hertz.

And while you're certain to find conventional power transistors in most conventional amplifiers, you won't find them in the SA 9800. You'll find specially developed RET (Ring Emitter Transistors) transistors that greatly increase frequency response. So instead of getting distortion at high frequencies, you get clean clear sound. Nothing more. Nothing less.

Instead of slow-to-react VU meters that give you average readings or more sophisticated LED's that give you limited resolution, the SA 9800 offers a Fluorescan metering system that is so fast and so precise it instantaneously follows every peak in the power to make sure you're never bothered by overload or clipping distortion.

And while most amplifiers try to impress you with all the things they do, the SA 9800 can even impress you with the one thing it simply doesn't do. It doesn't add anything to the sound it reproduces. An impressive 110dB S/N ratio is proof of it.

While these features alone are enough to outclass most popular amplifiers, the SA 9800 also offers features like DC phono and equalizer sections and DC flat and power amps that eliminate phase and transient distortion. Cartridge load selectors that let you get the most out of every cartridge. And independent left and right channel power supplies.

Obviously, it took revolutionary technology to build the SA 9800. But the same technology and skillful engineering that went into the SA 9800 also goes into every amplifier in Pioneer's new series.

At Pioneer, we're certain that others will soon be entering the class of 9800. And though they all may be built along similar lines, in terms of value Pioneer will always be in a class by itself.

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# Audio

"Successor to **RADIO**, Est. 1917"

## Feature Article

Interview/  
Jim Metzner/Sound Image 44 Tom Bingham

## Directory of Blank Tape and Ancillary Equipment

Blank Tape	54
Directory of Manufacturers	66
Ambience and Time-Delay Units	68
Noise-Reduction and Filter Systems	70
Compressors-Expanders	72
Record Care Accessories	74

## Equipment Profiles

Pioneer TX-9800 AM/FM Tuner	80	Leonard Feldman
Acoustic Research Model AR90 Loudspeaker	88	Richard C. Heyser
Ortofon MC-30 Moving-Coil Phono Cartridge	98	B. V. Pisha
Bauman Research Pro-400 Preamplifier	102	Leonard Feldman

## Workbench Profile

Crown RTA-2 Real-Time Analyzer	106	Howard A. Roberson
--------------------------------	-----	--------------------

## Record Reviews

The Column	116	Michael Tearson & Jon Tiven
Jazz & Blues	123	
Top of the Pile	126	
Classical	128	Edward Tatnall Canby
Folkbag	131	
Theater Music	133	Donald Spoto

## Audio in General

Behind the Scenes	6	Bert Whyte
Audio ETC	16	Edward Tatnall Canby
Tape Guide	24	Herman Burstein
Audioclinic	28	Joseph Giovanelli
What's New in Audio	34	
Video Scenes	38	Bert Whyte
The Bookshelf	110	
European Letter	112	Donald Aldous
Classified Advertising	135	
Free Information Service	146	

**About the Cover:** Although you may never interview a celebrity like Jackie O., you may have occasion to use microphones, as detailed in this issue's Audio ETC (pg. 16) and the interview with Jim Metzner of Sound Image (pg. 44). Photo: Photographic Illustrations, Philadelphia. Models: Barbara D'Aprile, Jeff Fischer, Pat-Griffin-Miller, Tom Burnett, and Lee Weber.

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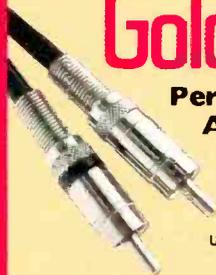
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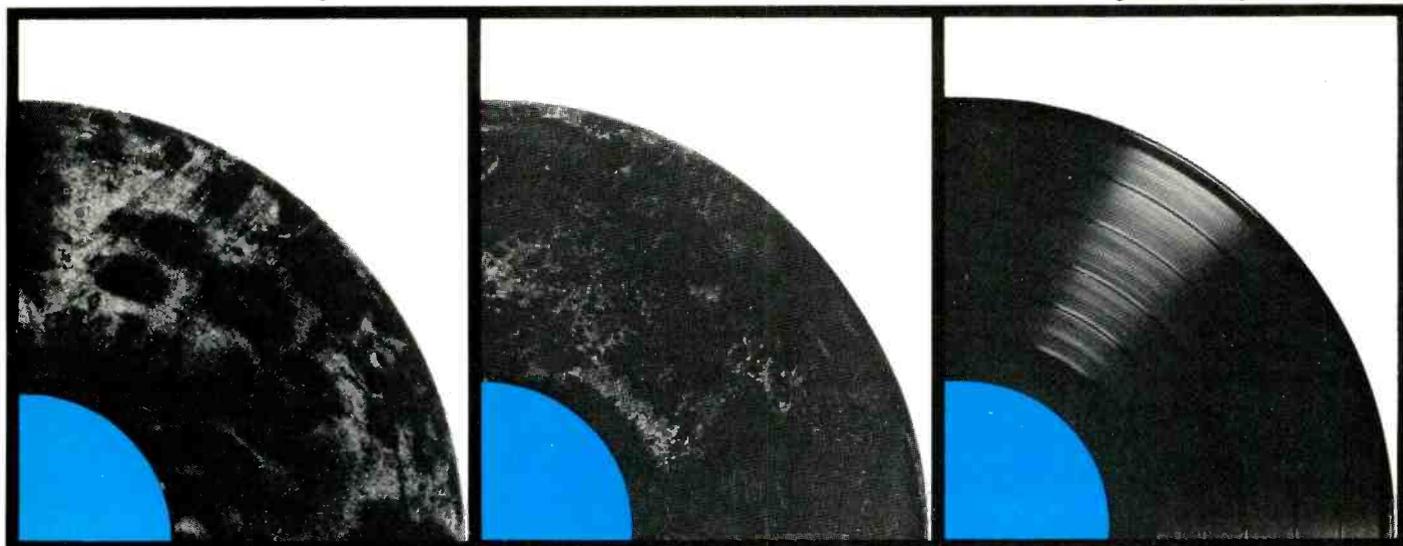
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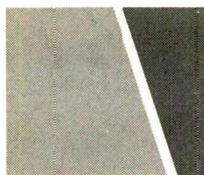
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 Eugene Pitts III

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 Kay Blumenthal

**Design**  
 Frank Moore

**Design Assistants**  
 Barbara D'Aprile, Mark Collins

**Production Manager**  
 Margaret Zibelman

**Associate Editors:**  
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**Senior Editors:**  
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**Contributing Editors/Artists:**  
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**Vice President/Publisher**  
 Jay L. Butler



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 Irvin J. Borowsky, Founder and President

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 Vijay Chowdhry, Production Director  
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 Mary Claffey, Vice President/Circulation  
 S. O. (Shap) Shapiro, Circulation Consultant  
 Jean Davis, Circulation Manager  
 Dorothy Yockey, Subscription Fulfillment Manager

**ADVERTISING SALES**

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

**East Coast Sales Office:** Laurel Carr, 545 Madison Ave.  
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# Behind the scenes

Between the AES convention in Los Angeles and the SCES in Chicago, it seems like I have been reporting on new audio products ad infinitum. Herewith (and with a sigh of relief), I present a near-final roundup of interesting new audio equipment from the SCES.

As I have noted in reviews of the past several shows, the horsepower race in receivers has indisputably ended, probably none too soon, and I understand that sales of receivers of more than 100 watts per channel are considerably depressed. Probably this stems from a combination of price resistance to the high cost of big-wattage receivers and their sheer bulk. On the other hand, the cost of such refinements as quartz, PLL tuning; d.c. amplifiers with fast rise times and high slew rates; digital frequency readout, etc., puts many receivers into the high-priced category. Frankly, I have never understood the rationale of the receiver market. To me, once an audiophile develops a certain degree of sophistication, I feel that he will reject receivers in favor of the flexibility and highly specialized qualities of separate components. I certainly have no quarrel with receiver engineers who incorporate refinements in their units to make them more salable. However, I find it a bit incongruous to find a \$750 receiver with a built-in pre-preamp for moving-coil cartridges, which on average cost about one-third as much as the receiver! Be that as it may, there was a myriad of receivers at the SCES in all price ranges, all with bountiful features in this most fiercely competitive of all hi-fi products. A few that caught my eye were the new Kenwood Hi-Speed Model KR-8050, a 120-watt-per-channel unit, with their pulse-count detector FM tuner and amplifier with a slew rate of 200 volts per microsecond; the Sansui Model G-7700, another 120-watt-per-channel receiver, with d.c.

amplification, digital quartz PLL, and Dolby noise reduction; the Yamaha Model CR2040, still another 120-watt-per-channel unit which features bass, treble, and midrange tone controls with continuously variable turnover frequencies, PLL and pre-preamp for moving-coil cartridges.

## New Amps

I know some far-out audiophiles (in the guise of friends of dealers) who stalk the corridors of the hotels at the SCES which host the high-end, esoteric exhibitors, looking for the new and nifty in preamps and amplifiers. Although I thought there were fewer high-technology amplifiers than usual, there were a number of interesting new designs . . . David Hafler, who re-entered the kit market with his remarkably successful DH-101 preamplifier, has introduced his new DH-200 100-watt-per-channel amplifier. Available as a factory-built or kit unit (with the latter at less than \$300), the DH-200 features exceptionally low THD and IM distortion and very low values of TIM. In fact, his sales brochure shows a series of spectrum analysis photos of IM content of his amplifier versus some decidedly unflattering views of competing amplifiers. The DH-200 can be bridged to a 300 watt/channel monophonic amplifier. For those who need brute power, the new Audire DM-700 may well be the answer at a relatively modest \$1,200.00. The product of former space-program engineer Julius Siksnius, the DM-700 can deliver over 400 watts/channel before clipping, is said to be very stable for all types of speaker loads, and can put out as much as 700 watts/channel

into two-ohm loads. It is a pretty fast unit at 80 V/ $\mu$ S, and I heard some of my own direct-disc recordings through, a pair of Dahlquists, and the sound was smooth on the top, finely detailed, with solid, clean bass.

Audionics of Oregon is a small company doing big things. To wit, after years of work and cooperation with Wesley Ruggles of Tate Systems, they have introduced their Space and Image Composer unit. Essentially this combines super-sophisticated SQ decoder (with over 40 dB of interchannel separation) and the Tate stereo directional enhancement system which can retrieve out-of-phase ambient information and highly directional sound vectors from conventional stereo recordings. With separation and "panorama" controls to augment and facilitate this information retrieval, this unit is far beyond any similar device in the past. For one thing, it operates as a Class-A device with exceptionally low distortion. Among its unique features is "axial tilt" correction, which electronically corrects by plus or minus seven degrees deviation from true perpendicularity of the phono stylus in the record groove. There is also a triangular display of LEDs which gives visual indication of the directionality of sounds. Quite apart from what feelings you might have about quadraphonics and SQ, this system does some really extraordinary things in the way of stereo enhancement and image synthesis. In due course, I'll bring you a full report on this device. Besides this unit, Audionics introduced their interesting BA-150 analog/digital hybrid solid-state/tube stereo amplifier. This is the final result of the David Berning

(of the National Bureau of Standards) design of several years ago. In this unit a Class-A solid-state circuit drives pairs of 6FL6 tubes (normally a pentode used in the horizontal circuits of color TV receivers) to an output of 150 watts/channel into



**Have you ever heard all the FM you paid for?** Even if you own a very sophisticated receiver, you rarely receive the FM it was built to deliver. The reasons boil down to the antenna. And that's why B-I-C invented The Beam Box, the first electronically directable FM antenna. Unlike the fixed dipole antenna, it can "face" all points on the compass. You simply tune to the signal's direction. And while it can't make a weak signal stronger, by discriminating it seems that it is. The Beam Box will virtually eliminate multipath reflections, and improve both stereo separation and signal-to-noise ratio. What's more, when you fine tune it to a signal's frequency, you tune out unwanted frequencies. For details write B-I-C|AVNET, Dept. B, Westbury, N.Y. 11590. **The Beam Box.**



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either 4, 8 or 16 ohms. As most users of tube amplifiers are aware, their ongoing problems are tube life and the maintenance of proper bias and balance throughout the tube life, as well as the necessity of obtaining matched tube pairs when replacement is necessary. In this BA-150, a CMOS digital logic circuit samples the operating parameters of the output tubes seven times per second and automatically and continuously adjusts tube bias and balance to the proper values. With this system, matched tubes are not needed, and the life of the 6LF6 is

estimated at over 30,000 hours! Another unique feature of the BA-150 is a front-panel switch which gives the user the option of applying 14-dB, 8-dB, or 0-dB negative feedback. I freely admit I am not a tube man, but many audiophiles are *aficionados* of tube amps, as witness the devotees of Audio Research. Incidentally, after having decided not to manufacture tube amplifiers anymore, Audio Research has evidently changed their mind and had a new 80 watt/channel tube amp at the SCES. In any case, my antipathies aside, this BA-150, while a hybrid sys-

tem, has the best sound of any tube amplifier in my experience.

Crown can truly be credited with starting the "super power" amplifier business with its pioneering DC-300. After several updatings of this amplifier, now they have an entirely new design, the PSA-2, rated at 220 watts per channel into 8 ohms and, in its mono bridged mode, a whopping 700 watts into 8 ohms! The "SA" designation stands for self-analyzing, and, literally, Crown has an analog computer in each half of the output stages to monitor the operating parameters of the 16 output transistors used in this amplifier. Unlike its predecessor, the PSA-2 has a two-speed, forced-air cooling system and a power transformer for each channel, rather than the single common transformer used in the DC-300. Crown claims very low values of TIM for this amplifier and, with a slew rate of 30 V/ $\mu$ S, is considerably faster than the older amplifier. Crown also introduced its new DL-2, "digilogic control center" and preamp, which has to be the ultimate "whistle and bells" system. A fascinating unit, with digital readouts of gain and computer interface buss, with separate phono module (and, in the last few days, their new moving-coil phono module), this is far too complex for description here, but a report will be forthcoming.

It is always a pleasure to visit Mark Levinson's room, where he displays and demonstrates the fruits of his ongoing devotion to his philosophy of "no compromise" audio technology. He has made some subtle refinements to his HQD loudspeaker/amplifier system, resulting in higher output capabilities and even greater sonic purity. Mark was playing some tape recordings on his ML-5... a Studer A80 modified with Levinson record and playback electronics. The recordings were made on this tape machine by Peter McGrath, the very bright and articulate owner of Sound Components, Inc., of Coral Gables, Fla., who is one of Mark's premier dealers in the U.S. Peter used a "purist" technique of a pair of omnidirectional Bruel and Kjaer microphones, with a specially modified Levinson LNP-2 preamplifier as his recording "console." A Chopin piano concerto was particularly well recorded, and, as heard through the HQD system, the reproduction was stunning in its clarity, transparency, and sheer uncolored musicality. Once again, the best sound at the SCES. On display was Mark Levinson's newest item, the ML-3 stereo power amplifier. This 120-lb. monster, sensibly equipped with

8

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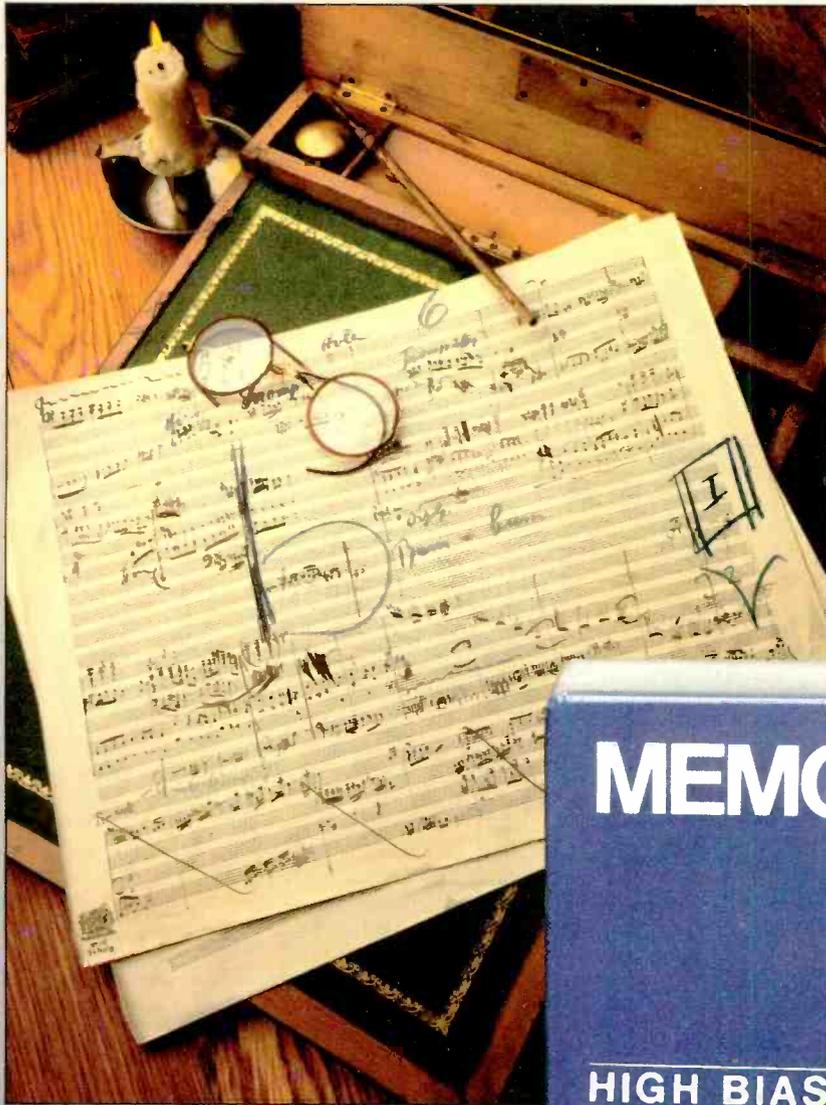
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# WHICH HIGH BIAS TAPE WINS WITH MAHLER'S FOURTH SYMPHONY?



Original manuscript sketch for the first movement of Gustav Mahler's Fourth Symphony. Courtesy of The Newberry Library, Chicago.

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There's an angled mirror to inspect the heads and a non-abrasive brush to dust away loose dirt. A specially-formulated cleaning fluid is applied by a

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It all fits neatly in a standard cassette box to store conveniently wherever you keep your cassettes.

When you think how many dollars your tape deck cost, the TDK Head Cleaning Kit makes a lot of sense.

**TDK**  
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handles front and rear so that two people can safely cope with its bulk, is built with the same "no holds barred" quality and precision of Mark's fabulous ML-2 Class-A amplifier. He uses a 1.2-kV/A toroidal transformer for each channel of the unit, along with 20 output transistors per channel! This Class AB amplifier is rated nominally at 200 watts per channel, but more importantly, it is capable of 45 volt pulses and a rather staggering current output of 30 amperes per channel. More about this \$3,000.00 beauty at a later date.

## Speaker Intros

Now to loudspeakers... needless to say, there were acres of them, a benumbing array of walnut boxes, generally of a stale sameness. As usual, I have to throw barbs at a great many speaker exhibitors for their simply awful demonstrations. Poor positioning, poor amplifier interfacing, incredibly bad demo music, terrible balances and gross distortions, all of which apparently were not audible to the generally inept personnel. Thank goodness, there are always notable exceptions to this cacophony, with some fine loudspeakers being demonstrated.

In my report on the AES convention, I mentioned Bob Fulton's new Premiere loudspeaker, an evolutionary design of his "J" system. This imposing monolith of a speaker stands 60 inches high, is 25 inches wide, and 22 inches deep. The speaker driver complement is one 12-in. subwoofer, one 12-in. midwoofer, one 10-in. upper woofer, one 8-in. midrange, and three special tweeters. Bob has abandoned the electrostatic tweeter array he used in the "J" system, mainly because of power handling limitations. His proprietary three-tweeter array is fused to handle one kilowatt of input! Crossover frequencies are 39 Hz, 122 Hz, 425 Hz, 2.4 kHz, 8 kHz, and a somewhat optimistic 26 kHz! I'll buy a bottle of Dom Perignon champagne for anyone who can adjust the top tweeter by ear. Well, Bob has some interesting theories on the production of ultra low- and high-frequency difference tones in a symphony orchestra, and he would rather offer the bandwidth for the probability of these frequencies than ignore them. As you would expect, the crossover network is very complex indeed, and it can be used for bi-amping or bi-wiring inputs. The Premiere can handle power inputs of more than 400 watts, and it can produce some awesome sonorities. The system is phase compensated, and imaging is very precise and stable. Throughout its entire range the Prem-

12

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AUDIO • November 1979

# Technics SL-1200 MK2. Tough enough to take the disco beat. And accurate enough to keep it.



Whether you spin records professionally or for pleasure, you'll be pleased with Technics SL-1200 MK2. After all, like our other professional turntables, the ones many radio stations use and discos abuse, the SL-1200 MK2 has the phenomenal accuracy of Technics quartz-locked direct drive: Speed accuracy is an astonishing  $\pm 0.002\%$ . Wow and flutter is a paltry  $0.025\%$  WRMS. Rumble is an infinitesimal  $-78\text{dB}$ . And the price is an unbelievable \$350.\*

Just as unbelievable is how well the SL-1200 MK2 resists acoustic feedback. Even with sound levels as high as those in a disco. The reasons: A solid aluminum diecast chassis, a heavy, one-piece rubber base, a double-damped platter and critically tuned spring legs.

But no matter where you are, you'll also value these other features: Quartz-locked variable pitch control ( $\pm 8\%$ ) that lets the professional instantly mix the beat of different

records and lets you tune a record to a particular instrument.

There's also a highly sensitive, low-mass, gimbal-suspension tonearm that puts and keeps your stylus where you want it with minimal friction of only  $7\text{ mg.}$ , both horizontally and vertically. And an illuminator that puts the record in a good light even when you aren't.

All this and Technics specifications, too. They invite comparison. Especially with the most expensive turntables.

MOTOR: Quartz-locked DC direct drive. SPEED:  $33\frac{1}{3}$  and  $45\text{ RPM}$ . STARTING TORQUE:  $1.5\text{ kg}\cdot\text{cm}$ . STARTUP TIME:  $0.7\text{ sec.}$  ( $90^\circ$  rotation at  $33\frac{1}{3}\text{ RPM}$ ). WOW AND FLUTTER:  $0.025\%$  WRMS. RUMBLE:  $-78\text{dB}$  (DIN B). PITCH ADJUSTMENT RANGE:  $\pm 8\%$ .

The SL-1200 MK2 from Technics. It has the same phenomenal accuracy of the Technics turntables many FM stations use and discos abuse.

\*Technics recommended price, but actual retail price will be set by dealers.

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Apt Corporation believes there's only one good reason to create a new product: a genuine need. The Apt 1 Amplifier is just such a product. With 3 dB of Dynamic Headroom, it can deliver as much as *twice* its 100w average rated power (20 Hz–20 kHz @ 0.03% THD) on musical peaks—just as program material so often requires. And, it can deliver this extra performance into any actual loudspeaker, not just on the test bench. The Apt 1 also incorporates new approaches to power supply, driver stage, and protection circuit design, which all contribute to a uniquely *useful* amplifier.

## Problem Solving in a Real System: The Holman Preamplifier

14



You don't live in an ideal world—neither does your stereo music system. The Holman Preamp is the result of over 2 man-years of research into how and why components behave in real-world hifi systems. As such, it provides an unprecedented balance of features and performance, which combine toward a common goal: *sonic excellence*.

The Holman Preamplifier and the Apt 1 Amplifier; individually or together they make music systems work better, and *sound* better.

For information, check the appropriate box(es) below and send with your name and address to:

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- Apt 1 Amplifier brochure and the name of your local dealer.
- Holman Preamplifier brochure.
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iere is very smooth and neutral, with no obtrusive resonances. Strings are a special delight, free of the stridency that faults so many systems. Bass is subterranean, solid, with no overhang. If you can afford \$4,900.00 per pair, you get one of the most musical speakers extant and one of the few speakers capable of coping with the dynamics of digital recording. If the Premiere is too rich for your musical diet, Bob Fulton has an alternative in his new Nuance speaker system, a sort of baby brother of the Premiere. Standing a more modest 34 inches high, the Nuance is 14 in. wide and 13 in. deep. The speaker complement is one 10-in. woofer, one 5-in. midrange, one midtweeter, and one super-tweeter. Crossover frequencies are 760 Hz, 6.5 kHz, and 15 kHz. Here too, the crossover permits bi-amping and bi-wiring. The Nuance has many characteristics of the Premiere . . . quite smooth sound, detailed and sweet top end, good imaging, and bass claimed to be a respectable 38 Hz. At \$990.00 per pair, the Nuance should fare well in the marketplace. Bob Fulton doesn't have dealers in every hamlet, so if you want information on his products he can be reached at the new location of Fulton Musical Industries, 4204 Brunswick Ave. N., Minneapolis, Minn. 55422; tel: 612/537-7076.

Acoustat was on hand with their full-range electrostatic speakers, now featuring their impressive Monitor Four unit in a redesigned cabinet sans the pedestal of the earlier unit. Brings down the bulk a bit, and permits better coupling to the room. The Acoustat X original design has been replaced with the Monitor Three. This uses their new "thin-wing" array of electrostatic panels to eliminate panel-frame resonances. Output has been increased and is now claimed to be a maximum of 110 dB at 20 feet from a pair of the units in a 14x24-foot room. As usual with Acoustat, a lovely clean sound, with sparkling transients and well-chosen demo material.

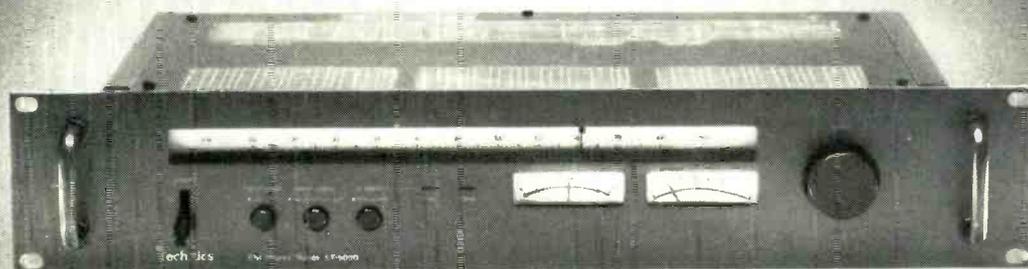
JBL was showing its new L150 speaker, a sort of scaled-down consumer version of last year's big L220 system. The system features a newly developed 12-in. woofer, with a 3-in. hand-wound voice coil, and a 10½-lb. ferrite magnet. A 12-in. passive radiator is also used in the bass section. A 5-in. midrange, with ¾-in. voice coil is placed in its own subchamber, and high frequencies are handled by a 1-in. dome radiator. The speaker is in the JBL tradition of high output, with lots of punch and presence, and solid bass. An indication of this is their recommendation that best performance is

with amplifiers of up to 300 watts per channel.

Last, but hardly least in loudspeakers at the SCES, was the latest offering of B&W . . . Bowers & Wilkins of England. This was their Model 801, the first of what they call their Series 80 systems. Genial John Bowers was on hand to explain that the 801 is B&W's first "no compromise; cost no object" speaker system. All the resources of modern technology were brought to bear in the design of the 801. Thus, a laser interferometer, courtesy of the Atomic Energy Research Establishment at Harwell, was used to measure vibrational modes in the speaker drive units, and this was interfaced with the company's in-house computer. Cross-over networks were designed by computer synthesis, and special materials developed for the cones of the drive units. A three-way system, the 801 employs a 270-mm woofer with a thermo-plastic cone and PVA compound coating, the 100-mm midrange driver is made of Kevlar, an aromatic polyamide fiber matrix, PVA impregnated, and a 26-mm tweeter made of multi-filament polyester weave, with a voice coil treated with high-temperature epoxy. The low-frequency system is a closed-box acoustic suspension, with system resonance at 37 Hz. Mid- and high-frequency drivers are in their own enclosures, and the entire system is phase compensated. There is a great deal more to the 801, which we will report on at a later date. The B&W demonstration was, as always, a model of a civilized, professional presentation, completely unostentatious and using superb demonstration material. The B&W 801 has to be one of the most important speaker designs in some time. It is meant to be used as a monitor in the strict sense of that abused term. It is capable of 106 dB SPL in rooms up to 7,000 cubic feet, and, with a special protection circuit, there's no upper limit placed on amplifier power! The sound is phenomenal . . . utterly clean, utterly uncolored, no spurious resonances, superb transient response, outstanding imaging, and tight, unboomy bass with remarkable extension for an enclosure approximately 38x20x23 in. There is no question that B&W has done a remarkable amount of original research on this design, and the superb sound justifies all their efforts. I am hoping to get a pair of these 801 units before long and will report on them in depth.

I see that, with the best intentions to wrap up the SCES, I'll have to write a little supplementary report on some turntables, cartridges, and a couple of specialized items. A

# The Technics ST-9030 tuner. Purists would feel better if it cost over \$1,000.



To some, tuners that offer 0.08% THD, 50 dB stereo separation, a capture ratio of 0.8 dB and waveform fidelity should demand a price tag of over \$1,000. But with the ST-9030 this performance can be yours for less than half that price.

That's quite a feat for a tuner. But then the ST-9030 is quite a tuner. It has two completely independent IF circuits: A narrow band, for ultra-sharp selectivity. And a wide band, for ultra-high separation and ultra-low distortion. It even selects the right band, depending on reception conditions, automatically.

Both bands give you the same extended flat frequency response. Because, unlike conventional tuners, the ST-9030 utilizes an electronic pilot cancel circuit that cuts the pilot signal, without cutting any of the high end. It's ingenious. And a Technics innovation.

The Technics ST-9030 has one of the quietest, most sensitive front ends of any tuner. With an advanced linear frequency 8-ganged tuning capacitor and 3

double-tuned circuits, plus dual gate MOS FETs in the 2-stage RF amplifier and balanced mixer circuit. What's more, there's a servo tuning circuit that locks into the tuned frequency, regardless of minor fluctuations. The result: Negligible drift distortion and maximum stereo separation.

Technics ST-9030. Compare specifications and prices. And you'll realize there's really no comparison.

THD (stereo): Wide—0.08% (1 kHz). Narrow—0.3% (1 kHz). S/N: 80 dB. FREQUENCY RESPONSE: 20 Hz—18 kHz +0.1, -0.5 dB. SELECTIVITY: Wide—25 dB. Narrow—90 dB. CAPTURE RATIO: Wide—0.8 dB. Narrow—2.0 dB. IF, IMAGE and SPURIOUS RESPONSE REJECTIONS (98 MHz): 135 dB. AM SUPPRESSION (wide): 58 dB. STEREO SEPARATION (1 kHz): Wide—50 dB. Narrow—40 dB. CARRIER LEAK: Variable—65 dB (19 kHz). Fixed—70 dB (19 kHz, 38 kHz).

Technics ST-9030. A rare combination of audio technology. A rare standard of audio excellence.

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# Audio etc.

Edward Tatnall Canby

I've been to another concert. Quite a remarkable experience for an inveterate hi-fi man like me. Especially when there's audio in the background.

I've played a lot of records in my lifetime, and sometimes, just for the experience, I like to revert to what I once was before LP and tape came along — a real 100 percent concertgoer. This last summer, on a particularly hot Saturday afternoon, I did just that. After so much super-digital and direct-to-disc it was an unusually interesting thing for me to do and the fi was superb. I'd almost forgotten.

As a young concertgoer I used to keep a weekly "calendar," derived from the Sunday New York Times, of all the New York concerts I wanted to hear in the coming week. I fairly haunted Town Hall and Carnegie and even the old Met Opera House, not at Lincoln Center and much dowdier. I had a subscription to the New Friends of Music on Sundays (next to Artur Schnabel's box) and a season ticket to the Philharmonic, under Toscanini himself, a tiny figure I saw week after week a quarter-mile down from my modest seat in Carnegie heaven. It was exciting.

Anyhow, I moved on into audio and tape and LP and pretty soon there was neither time for concerts nor musical energy. I had music to burn, and have ever since. So now every concert is a memorable one for me.

## Music Mountain Miking

As it turned out, this one was even more. The place was not New York but Music Mountain, out in rural northwest Connecticut, which last summer celebrated its 50th season of summer performances in its own auditorium, Gordon Hall, named after the founder, Jacques Gordon and his Gordon String Quartet which played there from 1930 until Gordon's death in 1948. I was on hand in those early years and often thereafter. Much later, in the same

hall, I taped extensive experiments in binaural sound for headphones while the Berkshire Quartet, successor to the Gordon, played its routine twice-a-day working rehearsal. I taped close-to, middle distance, far back, with mikes wide apart, mike close together — every combination, given the facilities I had on hand, which did not include such niceties as M-S and Ghent. Just two ordinary omnis, but the Gordon Hall acoustics made them shine. I still have the tapes.

minutes ahead of starting time. (Everybody comes early to get a "good" seat even though they are all good.) I was studying the elaborate wooden beaming and the interesting planes of the ceiling, with gambrels inward in several steps on each side like a New England barn turned inside out. Somebody, I said to myself, knew his concert hall acoustics, back in the Twenties. What a superbly functional way to cope with architectural stresses and at the same time insure a complex randomness of

sonic reflection! Must we have those blob-like reflectors and islands floating in the air, when randomness can so simply be achieved as functional structure ... Then I saw the mikes.

Most unobtrusive. Not one in a hundred people would have noticed them. This was a live concert. No signs saying SILENCE, no red lights, not even a mention in the program, but it turns out that everything we were hearing was

also being broadcast. Or taken down for broadcast.

Could our two worlds of music, the live and the miked, really exist together as easily as this? Could my two worlds, so to speak, cohabit? There I was, in that "other" world from ours, immersed in the living concert goings-on, and the only evidence I had for a vast and major part of my life were those little black objects overhead.

Now you would think that moments after this discovery I would have rushed backstage like a good audio reporter to get the facts, survey the semi-portable studio equipment that undoubtedly was there and maybe interview the attending engineers. Strangely, though, I felt rooted to my seat. I had come as a concert listener, I would stay as a concert listener. I had the unshakable feeling that if I moved so much as two feet towards that equipment, the sanctity of this fine music would somehow be violated. That's my imagination! So I stayed put.



Gordon Hall is a lovely and simple auditorium, both inside and outside, of a sort we dreadfully need in this day of zany modern concert acoustics. Outdoors, you see a long, white rectangle, clapboarded in the New England manner, against green shade trees and lawns. Inside, there is a high inward-sloping wood ceiling supported by an intricate structure of wooden beams, all the interior in natural wood color. On the plain floor are rows of church-like wooden pews (cushions can be had for sensitive bottoms), and along each side wall are double screen doors open to the green outside — many people sit outdoors just beyond them. Everything is wood in this building except maybe the nails. And it doesn't matter where you sit, the sound is big, bright, never harsh. It has been that way for all of the years I can remember it.

What started me on this writing was a glance ceilingward after I had got myself a seat (unreserved) some 20

# While our competitors were listening to Technics Linear Phase speakers, we introduced phase two.

When Technics introduced Linear Phase speakers two years ago, we took the audio world by surprise. And why not. After all Technics Linear Phase speakers were the first speakers to actually show you waveform fidelity. Not simply with tone bursts and sine waves, but by actually comparing the waveforms of live musical instruments to the output waveforms of our Linear Phase speakers.

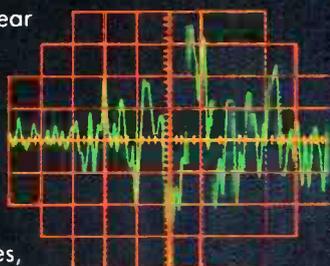
Now with the 3-way SB-6060 and 4-way SB-7070 (shown below), Technics takes you to phase two. Because compared to our first Linear Phase speakers both give you wider frequency extension, flatter frequency response and even more phase linearity, which means even better waveform fidelity.

How did we make such good speakers even better? We started with BASS (Basic Acoustic Simulation System), an IBM 370-based interactive computer system. With it, Technics engineers can do what they only dreamed of doing in the past: Calculate the sound pressure and distortion characteristics of transducers without physically building and measuring countless prototypes.

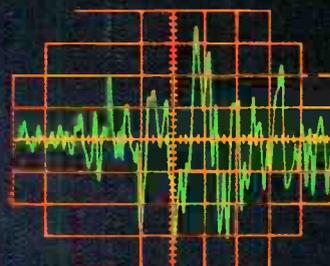
Next we took these computer-derived drivers and combined them with Technics unique phase-controlling crossover network. And of course we staggered the drivers to align their acoustic centers precisely.

It's easy to see the result of all this technology. Just compare the waveforms. On the left is a waveform of a live piano. On the right, the piano as reproduced by the SB-7070. That's waveform fidelity.

Listen to the 4-way SB-7070. What you'll hear is its smooth transition between low, mid-range and high frequencies. Then notice the bass response. It's deep and tight. With much more punch, better definition and even less THD distortion than its predecessor. That's because when the upper bass



Piano Waveform.



Piano Waveform reproduced by SB-7070.

frequencies are handled by a separate driver, the woofer does a much better job at handling the lower bass frequencies.

You'll also hear vocals that are smooth and natural. That's because the SB-7070's high-midrange driver was designed with "free edge" construction to avoid coloration of the critical upper-midrange frequencies.

And by adding a new, smaller tweeter with improved dispersion characteristics, the SB-7070's high end frequency response was extended to 32 kHz.

Technics 3-way SB-6060 and 4-way SB-7070. For music that sounds like it was originally played. Live.



All cabinetry is simulated wood.

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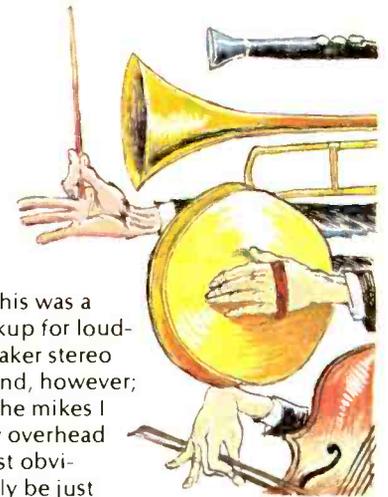
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## Binaural vs. Primary Locations

But, of course, not my mind. What sort of sound might they be getting, up there, through those mikes? You think I could help wondering? What I saw were two fat, round units with screens, undoubtedly omnis, placed far apart and halfway back in the hall from the low music stage, suspended from the bottom rank of wooden beams overhead. One mike was right over my head; this was the place I had chosen to sit for best sound.

No coincidence that in my earlier binaural experiments I had found this

exact area to be musically the most effective for a pure binaural headphone recording. I repeat, as I always do, that binaural mikes are placed where the sound is best for normal pairs of living ears. No coincidence, too, that some friends who had asked me where I thought they should sit were right across the hall from me, directly under the other microphone of the pair. And, I thought, there is a good stereo principle here, too; surely this same "best" area in any good hall is also the very best bet for stereo ambience mike placement. A mystic unity, if you wish. Or just plain good acoustics.



This was a pickup for loud-speaker stereo sound, however; so the mikes I saw overhead must obviously be just that, stereo ambience mikes. The primary pickup would have to be much closer to the music, as it always is for loudspeaker reproduction. Glancing forward accordingly, I saw the primary mikes, far up ahead of me and fastened to the same lower beam structure only a few feet in front of the musicians. Aha! No stereo separation—no pairs of microphones to right and to left; instead, one big complex array hung in the exact middle. Did that tell a nice story.

This would have to be one of the various dual-mike stereo systems, cross-mike, M-S and so on, that operate center-front from a single point. (Surely not a Ghent mike? That new type also works from a central point but SQ-encodes a dual signal from four mike elements, aiming itself 360 degrees front and rear and thereby including a selective rear ambience as well as the forward pickup. Ghent is now being used for stereo.) More likely something much simpler. What I saw (as I listened to Schubert) was a long, thin unit facing forward, surely a cardioid, plus a cross-member mike at right angles to it, probably an omni. So, thought I, do we have here a matrix setup? M-S?

Not, of course, the "matrix" some readers may still remember, as opposed to "discrete!" Matrices (pl.) have been around a long time, and even your phono cartridge is a matrix of sorts, as between lateral/vertical and 45/45. (Except the Decca; See *Audio* for August.) So you matrix the signals from these two mikes, in central position, and you come out with—stereo. A stereo spread. It works. At Music Mountain, it seemed, you also mix in some of that splendid wide-apart rear ambience to supplement the front mikes' product.

All in all, I mused (as I listened to Hindemith's *Der Todes Tod*, a song cycle of 1922 for soprano, two cellos,

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*The Complete Buyer's Guide to Stereo/Hi-Fi Equipment* put it this way: "... If you have a good stereo system ask yourself, 'Is there anything I could do for under \$1200 that would do so much to improve the realism of music reproduction in my home as the ADS 10?', the answer is certain to be 'no'. It's that good."

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\* Quoted by permission, *Stereo Review*, April 1979, and *The Complete Buyer's Guide to Stereo/Hi-Fi Equipment*, November 1978.

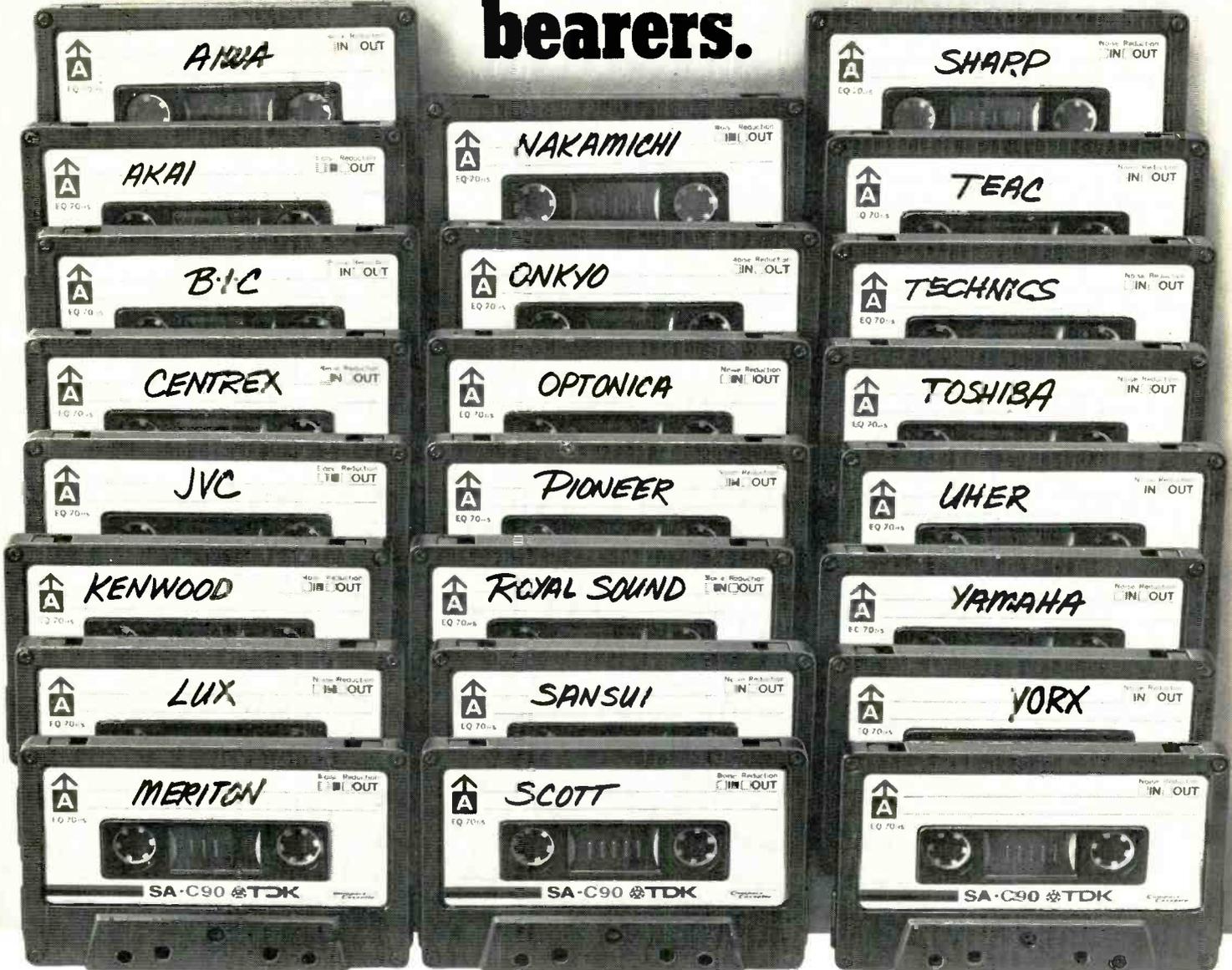


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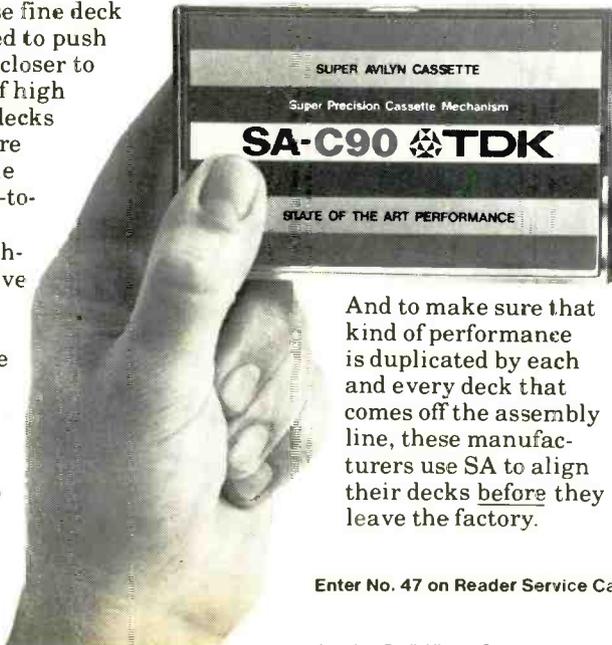
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and two violas and a real musical rarity only published in 1953)—all in all, this was a well-conceived and intelligent arrangement for broadcasting this particular concert and I would anticipate a fine musical signal just by the sheer look of things, sound unheard. That is, miked sound unheard; the living sound was all around me.

**Live vs. Recorded "Live"**

Credit Public Radio. That's who was doing the job. And, since the previous summer's Music Mountain concerts, 1978, were then being broadcast from

various PR stations I assume that next summer, or at least some time in 1980, you will in fact be hearing the very same concert on Public Radio that I was hearing live. Keep it in mind—Schubert, Hindemith and the Beethoven *Opus 132*. So even though our two worlds are separated in the time sense they remain together, out of the same human musical effort.

So, to finish, what is it really like to go to a 100 percent "real" concert? As compared to a Saturday afternoon with your tuner or records?

Well, it's an effort. Honestly, it isn't

easy. I'm not speaking of the musical content. Only the physical. True, you get real music in the flesh, as musicians never tire of pointing out. And a concert like this gives you an LP-and-a-half of music for only \$5.00, which isn't bad, even if you get to hear the music only once. But still—it is an effort. Every concert is. Always problems.

At home, for instance, you always have the "best seat" in the hall, assuming a responsible microphone technique. But in too many live concerts, alas, one often gets if not the worst seat, then one of hundreds of much-less-than-best seats in the hall. I've suffered from sheer concert inaudibility a lot more times than I like to remember. Though not at Music Mountain. And just look at the time it takes. Not all of it painful, of course, and a lot of it most pleasant—but time! Plenty. Look at what it took me for this one.

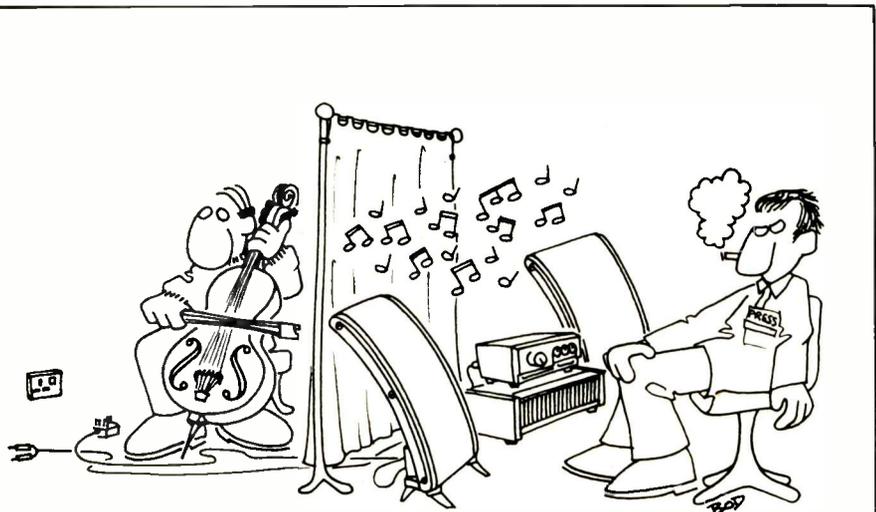
First, the dressing up (more or less) for an event, complete with shave and shower. Then the long drive over bone-rattling gravel mountain roads to the parking place, far out in a field as usual. Then the waiting in line at the box office, snail's pace, meeting friends and still other friends, all of us gradually edging towards our destination, a seat inside the hall—a total of maybe 25 minutes just from car to seat. An amiable 25 minutes, but still—time. Then the long wait to get started, while conversation roars ever louder and humidity rises in spite of a breeze that isn't enough to support so many hundreds of working respiratory systems. It's usually that way, at any concert.

Finally the slowly blinking lights—the concert is about to begin. More waiting and at last there is the measured entrance of the performers, to long applause and much bowing. This, though, is not followed by music. Instead, a protracted on-stage shuffling around and tuning-up and settling down, amid preparatory audience coughs and wheezes and scrapings and bumpings as the inevitable late people come in. And then, at LONG last, the music itself! It's already been hours.

**True Ambience**

Live music and a lovely sound, yes. But there are those endless heads that get in my visual way and dampen my acoustics—my neck is sore from shifting around for a clear channel. There's the over-breathed air. People, people everywhere, close and all around. The pretty girl in front of me who looks

20



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A visiting journalist recently suggested that we should not do this. Final adjustment should be done by ear, he said.

**What an opportunity!**

After all we know that if we add a little warmth with a subtle boost in the lower middle and balance this with an ever so gentle hump in the quack region (2-3kHz), we can make most programmes sound superficially more impressive. Come to that, why not change the 3180uS to 5000uS adding a little more 'heft' that most people will fall for. We could even make a special model for the boom and tizz brigade.

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# THE PHASE 7000 SETS OPTIMUM BIAS/LEVEL/EQ AUTOMATICALLY.



## LAB-TESTS EACH TAPE, INCLUDING METAL, AND STORES DATA IN MEMORY

The Phase 7000 is the cassette deck that can get the best out of every tape, because it has a microcomputer that works like a lab technician, testing each tape and making precise recording adjustments.

Every type of tape varies by manufacturer. So each tape needs a different bias, level and equalization setting to minimize distortion and flatten frequency response. Metal tape is so new that bias standards haven't even been set. So the ordinary 3-position bias controls can't possibly do it justice.

To make proper adjustments for recording, you'd have to put each tape through a lab test—the same test that's automatic in the Phase 7000!

## MICROSCAN: A MICROCOMPUTER WITH 9 MEMORIES



MicroScan automatically determines optimum bias/level/EQ, and stores this data for 9 different types of tape in its memory. Like a technician, MicroScan applies a test tone to the tape, then varies the bias current over 64 possible steps. It then scans the tape in playback to determine optimum bias with an accuracy of  $\pm 0.2$  dB. It sets optimum level and EQ the same way. You get the most out of Metal, STD, CrO<sub>2</sub> and Fe-Cr tapes. *And it takes less than 45 seconds.*

*Once MicroScan has determined the best settings, you can store this data in memory, ready for instant recall. No further scanning is necessary.*

## ADVANCED TAPE TRANSPORT SYSTEM

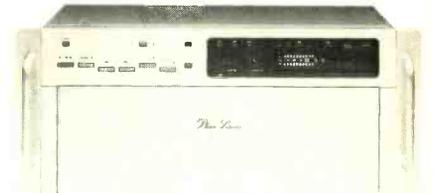
To avoid pitch variations, tape must travel at a constant speed. Most cassette decks have just one capstan, and a pressure roller to apply tension to the tape. But tape irregularities cause tension to vary in this system, increasing wow & flutter.

The Phase 7000 solves this problem with two direct drive capstans. The "drive" capstan and the "tension" cap-

stan are looped, so they rotate at precisely the same speed. Tape slack is automatically eliminated before the dual pinch rollers engage. The tape is isolated between the two rollers, so it's free from external vibrations. This helps keep your music free from pitch variations. And it reduces modulation noise to extremely low levels.

The "drive" capstan's speed is regulated by a quartz-phase lock loop system that detects any speed variations, and instantly corrects them. Speed drift is less than 0.02%. *And wow & flutter drops to an amazingly low -0.03% WRMS.*

## SPECTACULAR SPECS



The 7000 out-performs all other cassette decks, and rivals the best reel-to-reel. Signal/Noise with Dolby\* on is -70dB. Double Dolby allows you to record with Dolby, while monitoring it with Dolby. The 3-head system with Uni-Crystal Ferrite heads achieves a frequency response of 20Hz-20kHz, -20dB with metal tape. The fluorescent meter gives you 24-segment resolution for easy readings from -30dB to +8dB.

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**SONY**

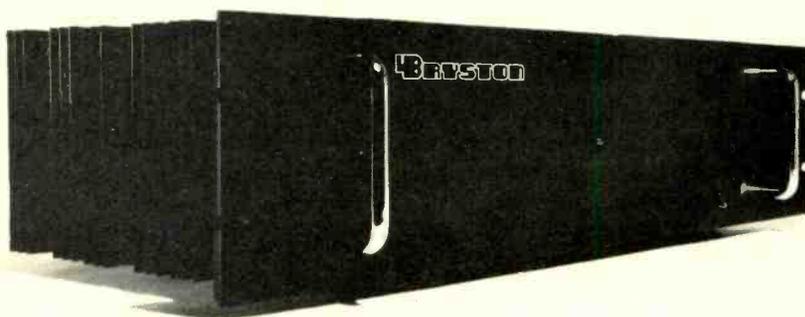
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bored to tears and almost is. The elderly man nodding dangerously, about to slide into his neighbor's lap. The lady behind who wheezes and the man in front who sneezes. People who whisper in loud tones, kids who won't shut up, the dropped pair of glasses—*crash!*—and the loud crackling of programs as pages are turned. Not to mention jet planes and hot rods, dogs and shouting people, all about six inches outside the open doors by the sound of them. Signal to noise? I'd hate to guess. And you complain about LPs.

Never been to a concert? Let's go on. Intermission. All the hundreds of people rise up and move ponderously to the outside, where they talk, and talk, and TALK. It's the Social Hour and it's forever. Then creep, creep, back they go snail-like again for the rest of the concert. By this time you could have played four LPs.

Now the second half, and everybody is fast fagging out, but bearing up. Even the musicians. Oh, for a retake or two, or a rest break, like a recording session! Not in a concert. They just wilt, and fag out, and play on to the end. Wild applause, even from the just-awakened, and off they go backstage. Then on again. And off again. And on again. And off again, while we continue to beat our hands numb. It's over! It was lovely! What a relief! So, now to another Social Hour on the endless way out to the parking lot, then a long wait for traffic to untangle and back over the bone-rattling roads to home — and another shower. It's needed. It was a hefty afternoon.

Yet concerts do go on and people are always around to go to them. Nor is it only the live music, nor yet that yen for "cultyah," that drags some of them out against their better sense. A concert, you see, is a social event in the most profound way, a Gathering of the Peoples. Not like a gathering of one or two around the home hi-fi. We are gregarious animals, and every one of us predictably reacts to that feeling of being a part of a mass of *people together*, for a purpose. It is an instinctive, a gutsy thing, whether at Music Mountain or Woodstock. A concert can get to you as no recorded classical music is likely to, and that's why there are still concerts. And people who go to them. In a human way, it's worth all the trouble.

I loved Music Mountain and I'll do it again. I loved the sound—the live music. And I loved the ambience—the gutsy feeling. You really oughta try it sometime, when you're tired of taking it easy in the living room. **A**

AUDIO • November 1979

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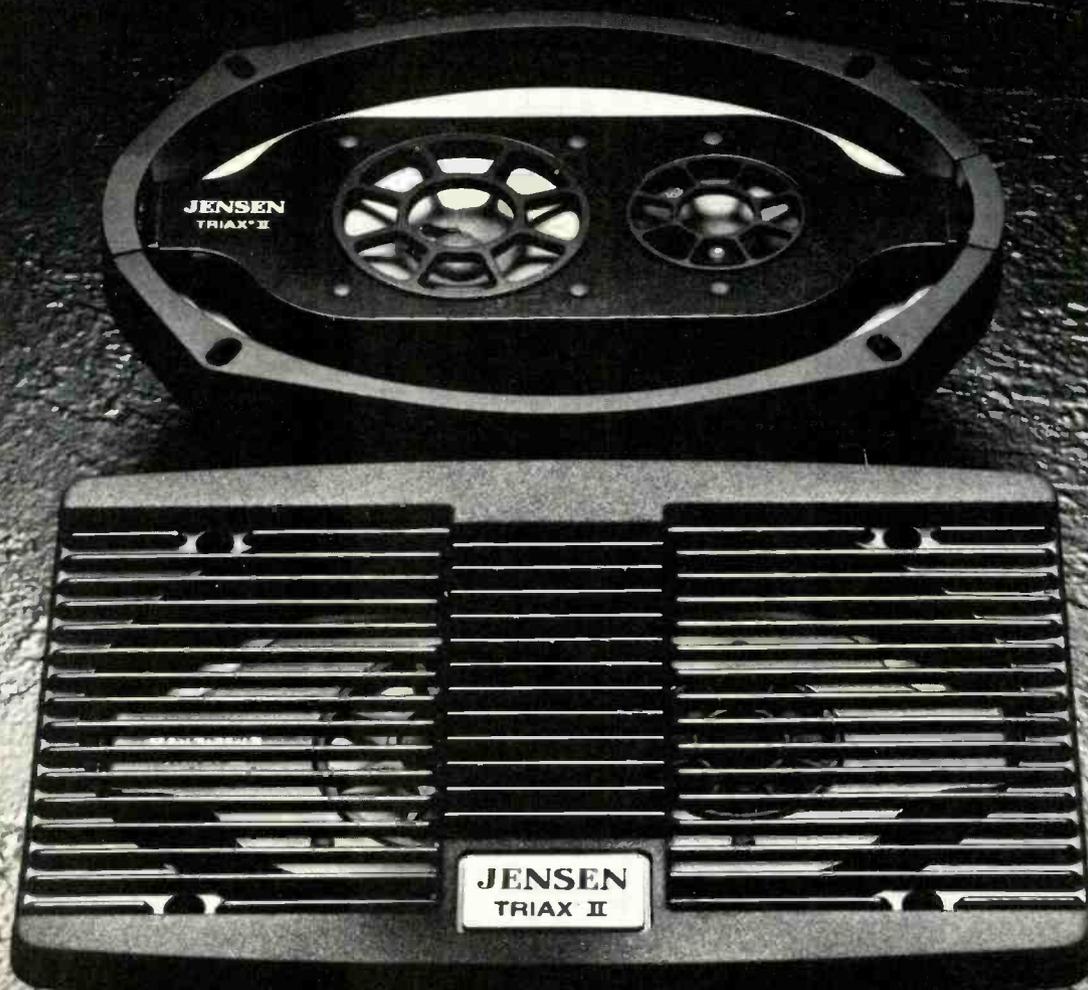
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# Tape guide

Herman Burstein

## Phasing

Q. I am interested in an audio process known as phasing, used effectively by many rock groups. Phasing is accomplished with three tape recorders, two used as playback units, with the same material, only slightly out of synchronization with one another. The third records the effects. As one tape recorder catches the other, phasing begins. As the two come closer together, the pitch rises to a maximum. This varying pitch is not present in either of the two original recordings. I would like to know what causes this effect. What are the two signal waveforms doing? Is this phase modulation? Frequency modulation? In case you are not familiar with this particular technique, enclosed is a tape containing some excerpts from records which use phasing. — Dan Keen, Avalon, N.J.

A. I am not certain about the reason for the phasing effects on the tape you sent me, but perhaps I can offer a partial explanation. When signals are in phase they augment each other and are louder; conversely for signals out of phase. Human hearing tends to provide an illusion of pitch change as loudness changes. Further, when a complex signal is combined out of phase with another complex signal (many frequencies), cancellation tends to be more effective at the lower frequencies. The net effect is of rising pitch. You can test this on a stereo system by tuning in noise on an FM tuner and combining the two signals out of phase — assuming your amplifier provides a switch for combining signals out of phase. You will notice an increase in apparent pitch of the combined signal.

## Dis-Service Manual

Q. Some time ago I purchased a tape deck. After reading the manual, I appear to have bitten off a helluva lot. The dealer has been helpful in trying to interpret the manual, but he is as much dismayed by some of its contents as I am. The manufacturer has not responded to my request for more detailed instructions. Can you suggest an approach that would enable me to obtain optimum results from the machine? What recording I have done

has been hit and miss, very good and very bad. — E.L. Boyce, San Francisco, Cal.

A. I am sorry but I am not in a position to rewrite a manufacturer's manual. I suggest that you put pressure on your dealer to obtain answers to your specific questions or refund your money. You might also ask the dealer who the manufacturer's sales representative is in your area, and put similar pressure on this individual. Let me repeat: You should prepare specific questions rather than make a broad request for more detailed instructions.

## Built-In Test Tones

Q. Back in 1972 you wrote an article advocating that tape decks should have built-in test tones. To be really useful, the test tones should go down to 20 Hz and up to 25 kHz. The harmonic distortion of these tones should be low to be of value. In my opinion, adding these circuits to an already complex as well as heavy machine is not really worthwhile. There are many good oscillators available that are a valuable adjunct to a serious enthusiast's equipment. — Ramon Valdes, New York, N.Y.

A. I tend to disagree with you about incorporation of test-tone facilities in a tape deck for the serious home recorder. Some test tones are better than no test tones. And very low distortion test tones are not needed for all purposes. I am not trying to say that built-in test tones would eliminate the need — particularly in the case of the technician — for a first-rate signal generator. But they would be a great convenience to the user and induce better maintenance on his part, as well as enabling him to extract maximum performance from his deck at all times. With respect to complexity, modern technology permits signal oscillators to be built in very miniature form, occupying a minimum of space and having a minimum of weight.

## Multi-Track Recordings

Q. I have a four-channel, three-head tape deck. I want to record separately on each channel in the sound-on-sound mode, and then mix down the four channels, using a stereo copy

deck. The problem is that with three heads the tracks are not in sync. I have heard of "Sel-Sync," but I'm not sure how it works. I think it converts the record head to a playback head on a track that has already been recorded. Please explain the Sel-Sync system and, if possible, tell me how to add it to my recorder. — Larry Swartzwelder, Harrisburg, Penn.

A. Your basic understanding of the Sel-Sync system (also known as multi-sync, etc.) is correct. It converts the record head to a playback head on the desired channel, so that in recording on another channel the playback signal will be in time synchronization with the signal being recorded. However, I can't give you instructions for converting your tape deck to Sel-Sync. What you might do is obtain a service manual (costing about \$2.00 to \$3.00) for one of the tape decks that has Sel-Sync and copy its Sel-Sync switching circuitry.

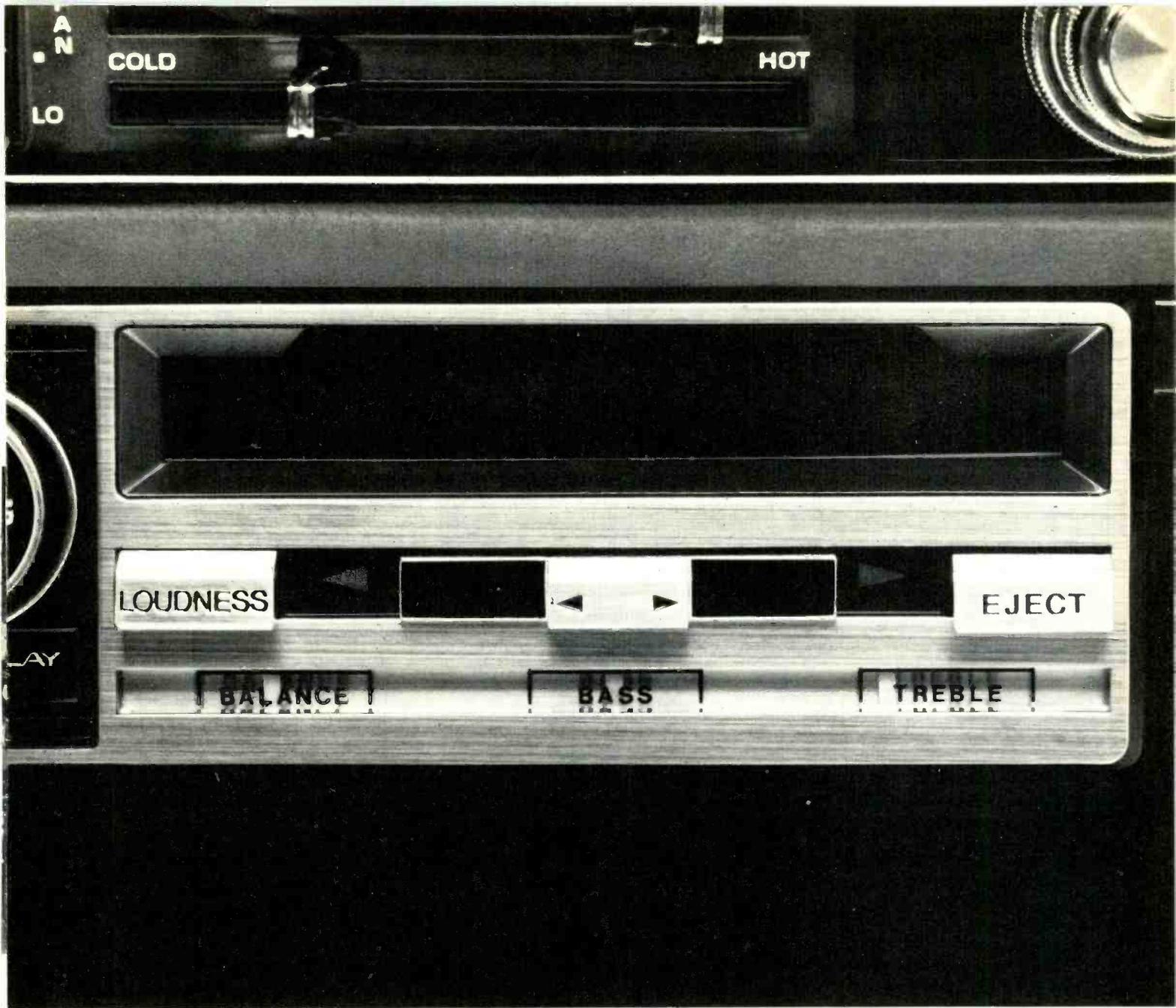
## Quarter-Track Vs. Half-Track Decks

Q. My problem is whether to get a quarter-track or half-track tape deck. I'm really not sure what the advantages of the half-track configuration are. — Stephen Irwin, Columbia, Ohio.

A. For home use I see no net advantage in half-track, other than an improvement of about 3 db in signal-to-noise ratio. While the extra 3 db is not to be sneezed at, a top quality home machine has sufficiently good S/N — particularly with Dolby — so that the deterioration in performance is hardly, if at all, noticeable. Meanwhile, quarter-track offers twice as much time per reel of tape, and has the advantage that errors in azimuth alignment do not adversely affect treble response as much as in the case of half-track. On the other hand, half-track is superior with respect to dropouts, because the wider track permits dropouts to average out better; still, top-quality tape

---

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



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today is so good that dropouts are rarely a problem. All in all, my vote is for quarter-track for the home, assuming you are not going to be editing tapes. If you are, which involves cutting and splicing, then you might get half-track.

#### Adding a Dolby Unit

**Q.** My tape deck has a non-Dolby single-pass noise suppressor. I have decided to add a Dolby unit. Can this unit and the built-in noise suppressor be used together? — Gary Leeds, South Orange, N.J.

**A.** Probably you should not use the two together. The built-in suppressor most likely works on the principle of cutting high frequencies, whereas the virtue of the Dolby unit is that it enables you to maintain treble response while at the same time reducing noise. You may want to use the built-in suppressor for tapes you recorded before acquiring the Dolby unit.

#### Bias Adjustment for Thicker Tape

**Q.** I have been told that using a thicker recording tape produces less print-through. However, the thicker

tape is harder to magnetize. Would it sound any better using the thicker tape if the bias could be adjusted for maximum undistorted output? How about equalization? — Susan Mackey, Kew Garden Hills, N.Y.

**A.** To my knowledge, thicker tape is not harder to magnetize. Any tape should be optimized in the sense of adjusting the tape deck's record equalization (treble boost), audio drive current, bias current, and record-level indication in accordance with the suggestions of the tape deck manufacturer. Usually this requires the services of a competent technician. Most tape decks come adjusted for a particular tape, such as Manufacturer X's low-noise/high-output tape No. —

#### Reel Tape Differences

**Q.** Is there any difference between high quality 1800-foot and 1200-foot, seven-in. open-reel tapes? — Fred Waites, Charlotte, N.C.

**A.** The advantage of 1½-mil tape (1200 feet per seven-in. reel) over 1-mil tape (1800 feet) would lie in higher signal output and lower print-through. However, from a practical point of view, these advantages are sufficiently slight so that the home recordist should not be inhibited from using 1-mil tape. In ordinary use, I doubt that you hear any difference between 1-mil and 1½-mil tape, everything else (oxide formulation, etc.) being the same.

#### Improving High Frequency Response

**Q.** To improve the high frequency response of my tape system, I want to purchase a graphic equalizer which would be inserted between my Dolby noise reduction unit and the deck. What is the likelihood of success? — David Ohde, Weaverville, Cal.

**A.** If inserted between the Dolby unit and the deck, the equalizer would tend to upset proper operation of the Dolby N/R. Keep in mind that the Dolby unit provides treble boost only for low-level signals, and for such signals it provides corresponding treble cut in playback. The presence of the equalizer would alter the information needed for proper Dolby decoding.

Therefore, the equalizer should be introduced prior to the Dolby unit. Specifically, the signal would be fed from your amplifier to the equalizer and thence to the tape deck. But be alert to the fact that treble boost supplied by the equalizer increases the chance of tape saturation at high frequencies. Accordingly, it may be advisable to reduce recording level several dB. A

## The New ADS L810-II "radical improvements wouldn't have been possible..."\*



(ADS L810 shown with optional stands F800)

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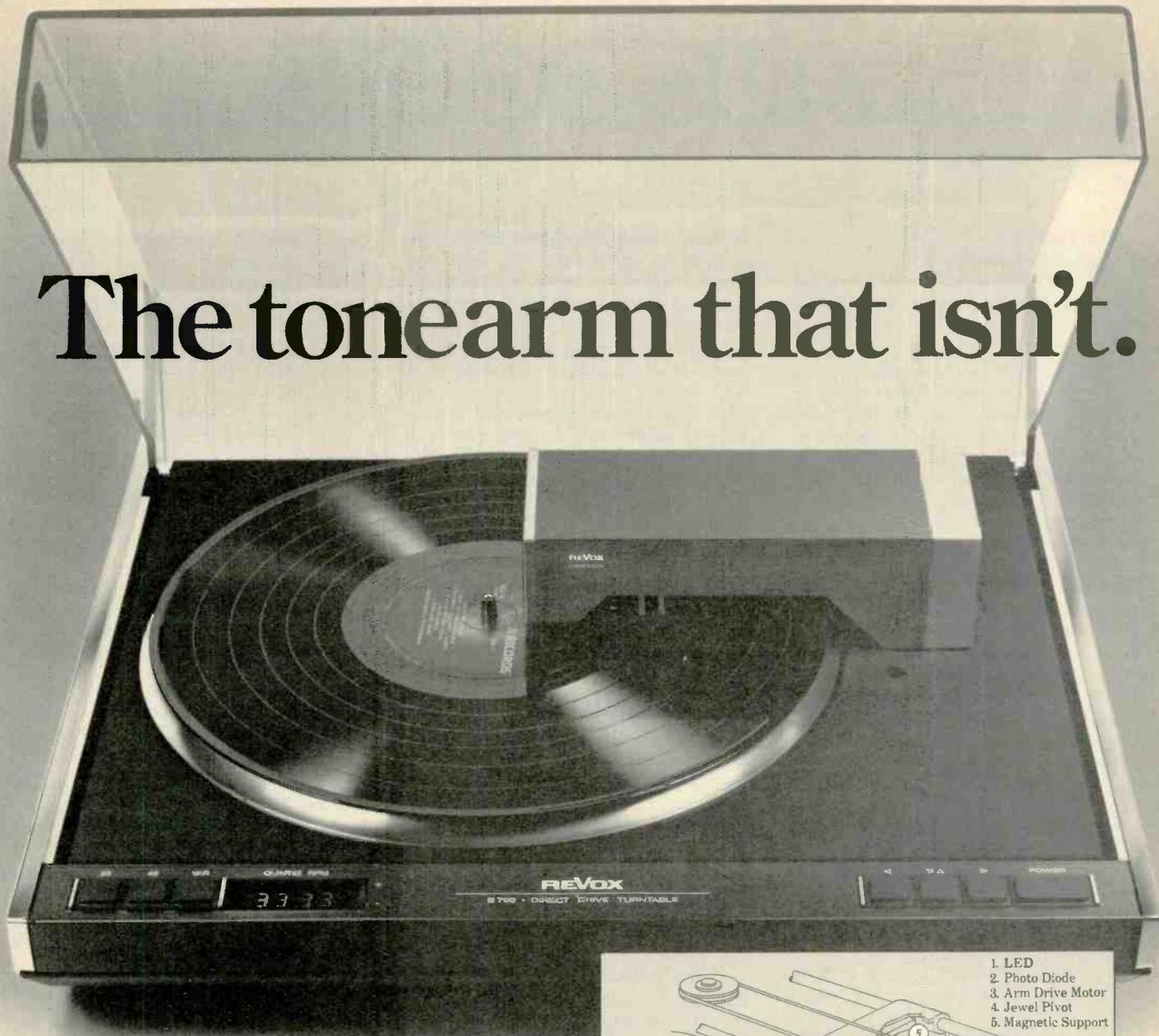
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# The tonearm that isn't.



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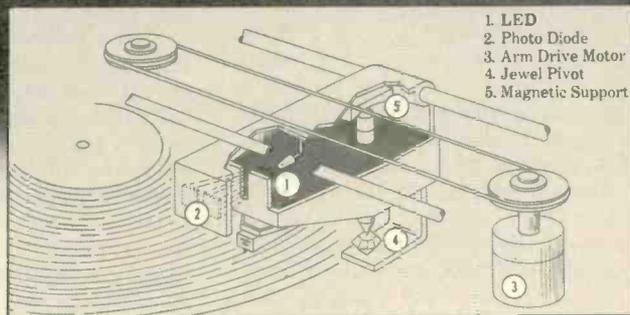
This sophisticated and highly refined electronic servo-system ensures that your records are played just the way they were cut, with perfect tangential tracking.

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With Linatrack, tracking error is reduced to a phenomenal 0.5° or less, virtually eliminating distortion and protecting your records from excessive wear.

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tal to constantly read and instantly correct rotational speed. This eliminates the moment-to-moment deviations found on even the most expensive conventional direct drive motors. You can verify speed accuracy with the fast responding LED digital readouts. The readouts also provide an accurate log of manual speed adjustments.

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# Audioclinic

Joseph Giovanelli

## Differences in Receiver Selectivity

*Q. What advantage would a receiver with 75-dB selectivity have over one which has 60-dB selectivity? — Lowell Knapp, Charleston, W. Va.*

A. If you are in an area where strong FM signals are present and wish to receive some other signals which are considerably weaker, and if these signals are located on what are known as "alternate channels," the receiver with 75-dB selectivity will be better able to receive the desired signal (with less interference from the nearby stronger signals) than would the receiver having only 60-dB alternate-channel selectivity.

If you are not interested in receiving relatively weak signals or if the signals to which you wish to listen are not located on the dial close to stronger signals, then it won't make much difference whether you have a lot or a little alternate-channel selectivity.

## Stereo vs. Mono

*Q. I would like your comments about the listening arrangements of two of my friends. The first has two rather small speakers, standing vertically, about two in. apart. They are toed in, so that lines from their centers would cross about a foot in front of the speakers. My friend sits six ft. from these speakers when listening, often way to one side.*

*The second friend has two medium-size speakers, also standing vertically, and also about two in. apart, but his are directed parallel. He sits about 14 ft. from them. I would like to know how much stereo effect each of them would get and how important it may be for them to have bought two speakers.*

*The preceding question was based on the assumption that stereo has some purpose in general, especially for my two friends, and I would like to question that assumption. I have had a high-fidelity system for some 17 years. I have never felt the need to "modernize" to stereo. Of course, I have heard friends' stereo equipment, not to mention quad, and I am really unimpressed. My reaction has always been that if I were sitting near the front of the concert hall, I would expect the sound of the strings to come from the left because I see them there. Likewise,*

*I would expect the sound of the percussion to come from the right, because I see them there. But at home what am I supposed to do — imagine the position of the instruments? I really could not care less where the instruments must be placed on a stage or in a pit. In fact, I wouldn't be surprised to learn that some composers had occasionally wished that the instruments in an orchestra could have been blended by being altogether in one little spot and had been frustrated by the impossibility of doing so. After all, in chamber music they do not space the instruments far apart just so the audience will get a stereo effect. Therefore, I would like to know if stereo is just a rip-off to sell twice as many speakers. — Thomas D. Stowe, New York, N.Y.*

A. In my opinion, with two-in. separation of two speakers, your friends may as well listen to mono discs or tapes. I cannot imagine how either one can hear any stereo at all, sitting so far from the speakers with such close spacing.

While these listening arrangements are quite far from what most use, listening is a subjective experience. If your friends have experimented and have come to the conclusion that their special setups are the best for them, that's fine.

Stereo serves as a means of localizing sound sources, and man was designed with two ears so that this localization is possible. Knowing which direction a sound is coming from could mean the difference between life and death in some situations.

Many composers, early and late, have experimented widely with stereo to get the most from live performances. Gabrielli and Ives are two notable examples. Antiphonal church music was designed to maximize the stereo effect.

If you believe that stereo is not useful for your enhanced listening enjoyment, fine. Good sound has been produced in mono for many years. Stereo discs can be played very well with monophonic equipment. The monophonic listener is considered during the processing of stereo discs, especially those in the popular music field.

For me, when stereo came along, it made an incredible difference to MY listening enjoyment. This was before I was seriously involved in audio. There-

fore, I don't believe I had an "axe to grind" in favor of people spending more money on speakers and special amplifiers, cartridges, and the like.

Because of stereo and its problems, cartridges advanced tremendously in performance. The results of this advance are that mono discs sound better today than when played on cartridges made when the discs were first released. There is a more transparent quality to many of these discs, especially at their inner diameters.

If it was true that stereo is actually a rip-off, eventually the public would have stopped buying it. But stereo has been with us in one form or another for more than 25 years. I judge from this that most people have found audible benefits from this kind of sound.

## Equipment Without Tone Controls or Filters

*Q. What is the purpose of building preamplifiers without tone controls and filter circuitry? — Gustavo Saetta, Buenos Aires, Argentina*

A. There are those who believe that an amplifier should ONLY have a flat frequency response, and filters and tone controls do affect such a flat response. Many others are concerned with maintaining the lowest possible amount of phase shift. Both tone controls and filters will introduce phase shift.

There are occasional deficiencies in program sources, with loudspeakers or with room acoustics, which can often be helped by the use of tone controls. Excess record scratch or low-frequency rumble can be reduced by the use of filters.

Some designers overcome these obstacles by designing tone controls which can, in one way or another, be completely switched out of the circuit. This will provide the flat response and low phase shift which some people desire.

If an individual feels so strongly about all of this that he will never use tone controls and filters, a preamplifier can be constructed for less money by not including these devices.

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

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But suppose you want to record on location. At a rock concert, say, or a performance of your church choir or glee club. Sony has mikes that, combined with your tape recorder, practically make up a portable studio.

Take the ECM-990F, an especially versatile and lightweight stereo Back Electret condenser mike. You can vary its directional quality to adapt for everything from solo voice to small groups to full orchestra.

Or choose an ECM-23F. It runs more than 6,500 hours on a single AA battery, and it's uni-directional. Use a pair when you want to create a stereo effect. The ECM-23F also incorporates Sony Back Electret technology.

## **RECORD FOR RECREATION AND STILL RECREATE NATURAL SOUND.**

Whatever you need to record, and wherever you need to record it, there's a choice Sony mike to do the job.

home, to record family sing-alongs. Or someone's performance on guitar or piano, for your own enjoyment.

You can still get a Sony Back Electret mike at a very affordable price. It's the ECM-260F, which plugs into a tape recorder and makes whatever you record—instrumentals, singing or speech—sound true to life.

For greatest versatility, use our ECM-150 omni-directional condenser mike. It's Sony's tiniest mike, smaller than a dime in circumference, and you can clip it to the fingerboard of a guitar or use it as a lapel or tie tack mike. (Incidentally, it's great for business conferences or any occasion when you want the mike to be inconspicuous.)

And now that you know which mikes to choose, all you need to do is see your Sony dealer.

Whatever you need to record, and wherever you need to record it, there's a choice Sony mike to do the job.

# **SONY**

We've never put our name on anything that wasn't the best.

## Power Boosters

*Q. I have an antenna preamplifier with a remote power supply, in addition to a broadband VHF distributor. Will I be overamplifying the signal and burn out either my FM or my TV set if I connect these to my equipment? — George B. Kritchen, Fairfield, Penna.*

A. I do not believe the use of these will burn out either of your receivers. However, it is possible that, if you are located near strong stations, your receivers may be overloaded which will manifest itself in the form of the station appearing at various points along the dial or as background to other stations being received. If both of these items do contain amplifiers, then you stand this chance of overload.

You may not be able to check for overload without installing the amplifier and distributor properly. This way you can, and should, check for added noise and distortion. Use an indoor antenna of some kind connected to each receiver in turn. Then note the strength of each signal received, the number of such signals, and the freedom from background noise. Do not move the antenna; connect the amplifier and distribution device as indicated, and make similar checks. If the signal strength is improved and you hear more signals, free from annoying background noise, the reception of your system will have been improved. If overload is present under these conditions, you will know that it will be far worse with an outdoor antenna.

## Audio With Co-Axial Cable

*Q. I want to make connecting cords for my stereo audio lines, cut to exact length for the sake of neatness and to avoid the problems which can arise from having excess cable coiled in the vicinity of a.c. lines. I would like to use RG-58/U co-axial cable from the tuner and tape deck to the preamplifier, and from the turntable to the preamplifier. The longest run will be about 24 in. In addition, I want to run about 25 ft. of co-ax to carry the signal from the preamplifier gain output to an Advent SoundSpace Control which is located at my listening position. Is there any reason why I should not use this type of cable?—David E. Illig, New York, N.Y.*

A. You can use RG-58/U cable, but I see no benefit from doing so. It is not flexible; the center conductor is solid wire. If the cable is handled very much, this conductor can break, probably at one of the connectors. Why not use ordinary audio cable? You will

not have any problems, even with the 25-ft. run you mentioned. If you encounter any serious interference problems, then consider special cables.

## Speaker Shrillness With "Dynaco" Four-Channel

*Q. I own the best stereo system that there is, the best of everything. Recently I bought two extra speakers to be used with the Dynaco quadrasonic sound circuit and installed them in the rear of my listening room. These speakers spoiled the total sound, introducing painful, shrill distortion. I could not believe they could be so bad. I took one to my basement where I have a TV set and fed sound from this set via a 60-watt amplifier. The sound was clean, with good definition, and without any trace of shrillness.*

*In my stereo system I use solid-state amplifiers. The two new speakers are each eight ohms, connected in series and between the "hot" terminals of the amplifier. What causes a speaker to produce such shrill sound when apparently everything concerned is in good order? — Name withheld.*

A. From what I can see, the sound produced by the rear speakers is quite loud with respect to that from the front speakers. Regardless of what kind of audio quality these rear speakers can produce, you should not really be aware of them for good quad sound.

I suggest that you place a variable resistor in series with the rear speakers so that you can adjust their relative level of sound for proper balance. This variable resistor will also provide better conditions for your amplifier. If, indeed, the amplifier is too heavily loaded by the rear speakers, the load will be relieved by reducing the power supplied to them.

If you ever need to check out a loudspeaker as you did in this instance, do not use audio from a TV set. TV sound is poor most of the time, usually rolled off at the high end. (It is improving, however, partly because of some rather interesting new transmission techniques.) Phonograph records with which you are thoroughly familiar are your best sources for checking a speaker system.

Perhaps it should be added that the manner in which you have connected your speakers means that the rear-channel speakers will produce the difference signal between the left and right channels of a conventional stereo signal. Because of the nature of phonograph records, this difference signal is the vertical component of the modulation impressed on the grooves. Any

tracing distortion is exaggerated when one listens to the vertical component of stereo recordings. The problem is more apparent when the rear-channel speakers are too loud.

## Turnover Controls

*Q. I recently bought a receiver which has two "turnover" switches. The function is puzzling to me.*

*The frequencies are: bass, 400 and 200 Hz; treble, 2.5 kHz and 5 kHz. When I put the bass turnover switch to 200 Hz, the bass does not sound as deep or obvious as at 400 Hz, which makes no sense to me. — Peter A. Kass, Milwaukee, Wisc.*

A. The bass tone control affects low frequencies; the treble control affects higher frequencies. Once bass boost starts, the amount of bass increases with decreasing frequency. With treble boost, the amount increases with increasing frequency. The turnover controls are means by which you can choose between two "starting points" for bass and two for treble.

Let's examine the bass. If we assume a starting point of 200 Hz, and if we are boosting bass, let us say that we have 8 dB of bass boost by the time the frequency descends to 50 Hz. Let us now assume a starting point of 400 Hz. Remember that bass increases with decreasing frequency below this starting point. Because we started at a higher frequency, by the time we get down to 50 Hz we may have 14 dB of bass boost. Therefore, you will hear more bass with the control set to its 400 Hz position than you will when it is set to its 200-Hz setting.

## Sound from a Phonograph Stylus

*Q. I was standing near my turntable with its dustcover raised and heard music coming from the stylus. It seemed as though there was a small speaker at the end of the stylus. I cleaned it, doubly cleaned the record, and still heard this music. What is causing this? — Robert D. Delorme, West Warwick, R.I.*

A. In any phonograph system you should expect to hear some sound coming from the stylus/cartridge/shell combination. The stylus does contain some mass, and this mass is moving. If there is a moving mass, it must come into contact with surrounding air, some of which will be pushed. In this manner sound is generated from any vibrating object, including a phonograph stylus. Added to this is the fact that the tonearm shell is a small resonator, and thus it provides a means of slightly amplifying the sound produced by the stylus. **A**

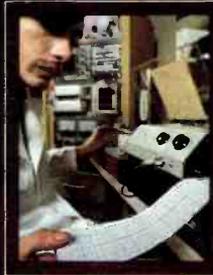
# Presenting the \$200 cartridge that costs \$3000 to hear.

**The Quest for Perfection.** At \$200, the Micro-Acoustics 530-mp offers the same patented\* direct-coupled transducing system as our other highly-praised stereo cartridges. The same twin-pivot design, for superior transient ability. The same dual-bearing construction, for outstanding tracking ability. The same built-in microcircuit. And, like the 2002-e, the same super-light beryllium cantilever and low-mass design. Plus more.

For those very few people whose pursuit of perfection overrides everything else, the 530-mp offers two subtle refinements not found on our other cartridges.

But the improvements these refinements provide can be realized only on a system representing, at the very least, an investment of \$3,000 in turntable/tonearm, preamp, amplifier and speakers. And even then, only by individuals with the most discriminating ears. In other words, less than 2% of component high-fidelity system owners.

**An Analog Stylus.** The new 530-mp features a Micro-Point™



**Graphic Recorder**  
Plotting of Individual 530-mp frequency response.



**V-groove Lapidary**  
Final polishing of stylus, mounted on beryllium shank.

playback stylus. It is an exact analog of our Micro-Point recording stylus, used to master over 500,000,000 of the world's best stereo discs this year. By replicating the recording stylus geometry, the 530-mp stylus provides optimum groove contact. The result is unsurpassed definition.

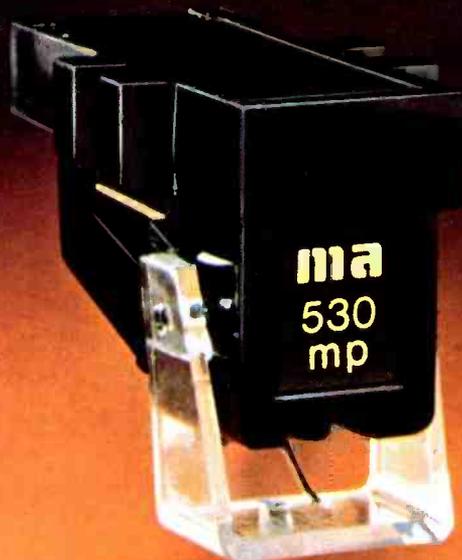
**Individual Curve.** Like our other cartridges, each 530-mp undergoes numerous demanding QC tests, monitored by sensitive electronic equipment. In addition, each 530-mp

must run the gauntlet of further tests, culminating in an individual frequency response curve. After checking and initialling the curve (which is then packed with the unit), the senior quality inspector serializes the cartridge and approves it for shipment.

**\$3,000 Later.** With all these refinements, however, the sonic difference between our top-rated 2002-e and the new 530-mp is admittedly very subtle. (In fact, for most applications, the 2002-e is all you'll probably ever need.) But if you've invested \$3,000 or more in state-of-the-art equipment, subtle differences are obviously important to you. Important enough to audition our 530-mp.

For more information and the name of your nearest dealer, please write or call: Micro-Acoustics Corporation, 8 Westchester Plaza, Elmsford, NY 10523 (914) 592-7627. In Canada, H. Roy Gray, Ltd., Markham, Ont.

**ma**  
**Micro-Acoustics**  
"Because good tracking isn't enough."



# Why JVC's new metal decks knock out your ears and not your wallet.



## Free tape.

Even though we knocked out the hi-fi world last year with the world's first true metal-compatible deck, we're not the only company that sells them now. So we've decided to stay one jump ahead by offering you SIX metal compatible models from \$299 to \$749.\* Each packed with a free Metafine C-46 metal particle cassette.

One reason we're doing this is because our metal-compatible, KD-Series decks perform so well with conventional tape, you might never get around to buying a metal tape!

But pop the Metafine cassette in and you'll hear the difference. Suddenly you've gained 6dB output level, 10dB signal-to-noise and at least 3000 Hz of high end. Even more with our computerized KD-A8!

## Features like Sen-Alloy™ and Super-ANRS even at \$299.\*

Our key to metal tape performance is all in our heads. Super-hard, low-distortion Sen-Alloy heads different from any other manufacturer's. When we toss in our unique Super-ANRS noise reduction system that adds 10dB S/N at 5kHz and our

famous Multi-Peak recording indicators, you get a knock-out sound.

And all in decks starting at less than \$300.\*

## T-shirts and posters at your JVC dealers.

The arrival of a whole line of decks this good for prices this reasonable is worth celebrating. So we've outfitted participating



dealers with free posters and even some limited edition T-shirts, all with our knock-out Technical Knockout graphic.

Just walk in and ask to hear a comparison of conventional oxide performance versus metal

particle tape in a JVC KD-A3, A5, A6, or A8. (The three-head KD-A77 and two-color fluorescent meter A7 will be in the stores by December.)

Where do you go to hear for yourself just how much better metal sounds than oxide?

## Call 800-221-7502 and get knocked out.

That's the toll-free number that tells you where you'll find your nearest participating JVC dealer. (In New York, call 212-476-8300.) Drop in to see and hear the technical knock-outs, including the top-of-the-line KD-A8. It features B.E.S.T., the computerized bias/equalization/sensitivity tuning system that fine-tunes the deck to any tape  $\pm 1/2$ dB, special "X-cut" heads that add another octave of bass (flat all the way down to 25Hz!), solenoid operation, Multi-Peak recording indicators, and a host of other audiophilia.

Stop in and take advantage of the free metal tape with each deck, and free posters and T-shirts, while supplies last.

But stunning as JVC's new metal decks are, free offers like these won't last for long.

**Now you're ready for JVC.**

**JVC**  
US JVC CORP.



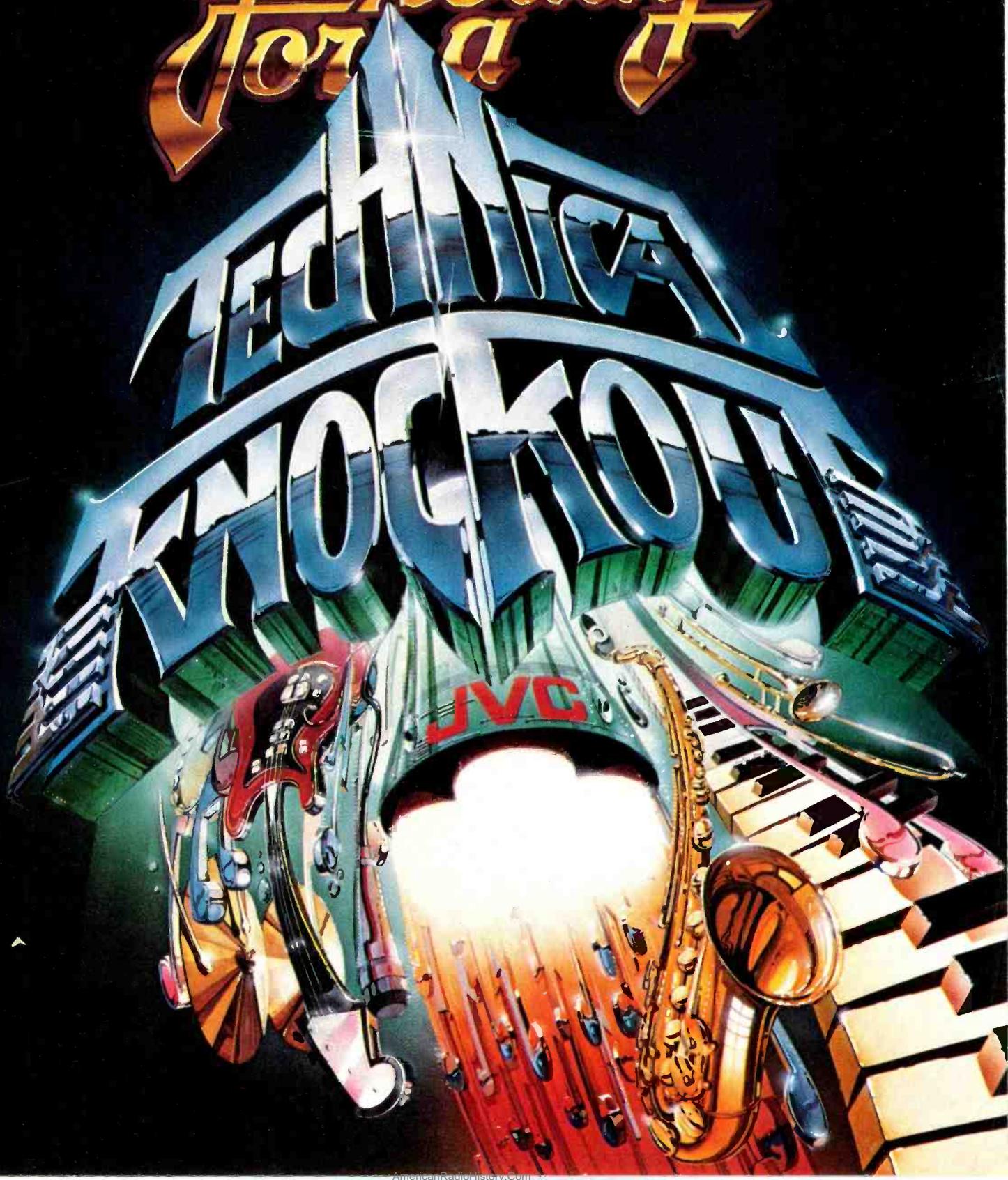
KD A8 with B.E.S.T., KD A3, KD A5

Shown: KD A8 with B.E.S.T., KD A5, KD A3.

\*Suggested Retail Price.

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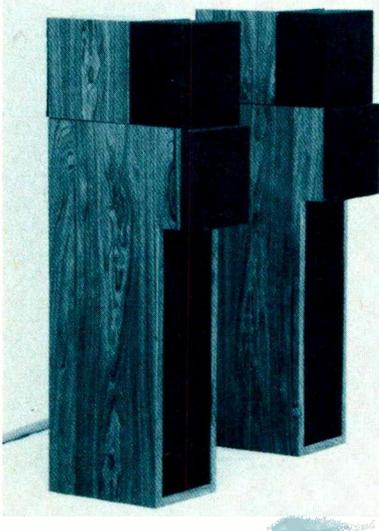
Get  
Ready  
For a



# What's New

## Precedent Speaker System

Mz-Mod III, a modular design, consists of three drivers in separate cabinets that stack upon each other. Transmission lines, which gradually absorb and compress a driver's back wave to



eliminate its muddying effect, are utilized for both the 8-in. woofer (in a 9½-ft. trans. line) and the 5-in. midrange (in a 7½-ft. trans. line). The tweeter, a KEF T-27, is free-standing on a cabinet containing the crossover network. The power requirement for the 8-ohm speaker is from 35 to 100 W, and its frequency response is 40 Hz to 20 kHz, ±2½ dB. Price: \$1,333.00 per pair.

Enter No. 100 on Reader Service Card

## Sonus Cartridge

Dimension 5 utilizes a Lambda stylus with an integrated single transmission path cantilever to provide an increased degree of phase coherence. Uni-pivot suspension, incorporating a light damping device, helps insure the low distortion and prevents stiffening of the moving assembly. The cartridge, with a user-replaceable stylus, requires neither a transformer nor a pre-amp. Price: \$250.00.

Enter No. 101 on Reader Service Card

## Ace Audio Subsonic Filter

Model 4000 helps prevent excessive speaker cone motion, bottoming, pumping, and IM distortion by provid-



ing an 18 dB-per-octave roll-off below 20 Hz. Distortion is rated at 0.01 percent, and hum and noise at -86 dB. Price: \$89.25; kit, \$59.25.

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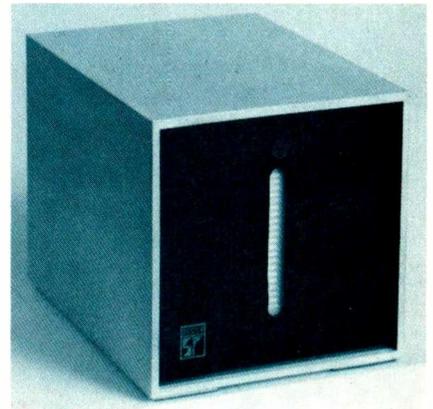
## Design Acoustics Speaker

Model D-4A's drivers are located on three panels: Two woofers and two tweeters on the angled side panels, and a midrange driver and one tweeter on the front panel. This design helps achieve wide dispersion of high frequencies and improved coupling of the low-frequency drivers to room boundaries. Specified frequency response is 35 Hz to 18 kHz, ±3 dB, crossover frequencies are 700 Hz and 2 kHz, and nominal impedance is four ohms. Price: \$278.00.

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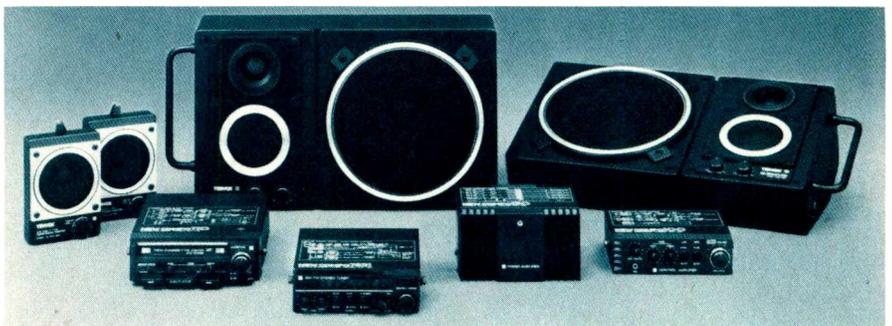
## Decca Add-On Tweeter

The Super Tweeter employs a magnetic system and special ribbon element to cover a frequency-response range from 7 kHz to 30 kHz. The mass of its diaphragm is very small so that when electrical current is applied, the ribbon vibrates instantly; it also stops immediately if the current is removed because of the strong magnetic flux. A protection filter, built into the 5-lb.



unit, operates below the crossover point of 7 kHz to prevent damage to the ribbon element. Price: \$199.50.

Enter No. 104 on Reader Service Card



## Fujitsu Ten Car Stereo Systems

The Audio Compo Line offers a choice of components including a two-channel or four-channel amplifier, an AM/FM or FM tuner, a cassette deck, and several speakers. The four-channel amp, Model PA-150F, delivers 20 W rms per channel (8 ohms). S/N is 80 dB, and stereo separation is better than 50 dB. Frequency response of the SP-710 cassette deck is from 30 Hz to 14 kHz, with S/N better than 50 dB. Features include automatic reverse, fast

forward and rewind, tape direction lights, and a dual concentric volume and balance control. The AM/FM tuner, Model AT-7831, incorporates an FET FM front end, and its selectivity is better than 64 dB, with stereo separation better than 25 dB. Three-way speakers, Model SSB8B7, are rated at 8 ohms and handle 20 W per channel with a frequency response from 100 Hz to 20 kHz. Prices: PA-150F, \$151.95; SP-710, \$194.95; AT-7831, \$201.95; SSB8B7, \$172.95 per pair.

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# ACCURACY. JBL LAYS IT ON THE LINE.

Why do so many stars and studios use JBLs? And more discos\* than any other speaker?

Accuracy is the answer. The music as performed. That's the sound the pros insist on. No wonder 7 of the 10 top albums in 1978 were recorded, mixed or mastered on JBLs.\*\*

And that's the sound we demand in every speaker in our line. JBL speakers are designed

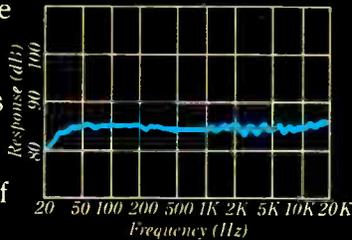
to match the music as played. Clear and lifelike.

We can state this with some price since we create our speakers from the ground up. Concept, design, individual components—all are created at our plant and tested against stringent engineering specifications. Rigorous quality control is applied every step of the way.

We could go into more technical detail

but we want to keep our message short and sweet. The reason so many stars, studios and professional installations prefer our speakers is JBL accuracy. Their living depends on how good they sound. So if you question your own ears, trust theirs.

James B. Lansing Sound, Inc., 8500 Balboa Boulevard, Northridge, CA 91329.



On-axis frequency response, L212 system.

**FIRST**   
**WITH THE**  
**PROS.**

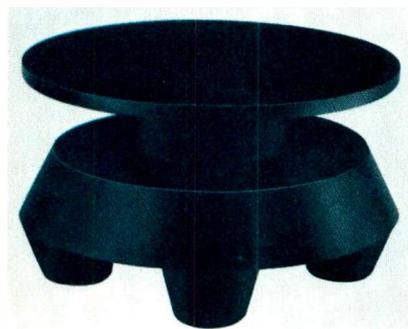


\*Billboard Disco Survey, 1978.  
\*\*Recording Institute of America Survey.

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## Discwasher Turntable Accessory

The DiscFoot System is designed to act in series with existing turntable feet to achieve optimal turntable isolation from airborne speaker feedback and surface-borne vibrations. The system includes four isolation feet, furni-



ture-protective sheets, platform caps for attachment to turntable feet, and damping foam pads. Use of the DiscFoot can minimize turntable response to airborne, blurred bass frequencies by as much as 25 dB, and by as much as 20 dB for surface-borne vibrations such as those caused by footfalls. Price: \$22.00.

Enter No. 106 on Reader Service Card

## Yamaha Preamplifier

Model C-6 preamplifier offers parametric tone control, enabling the user to continuously and independently control center frequency, frequency bandwidth, and sound level in two independent bands. Center frequency control in the Low band is 31.5 Hz to 640 Hz, and 640 Hz to 12.5 kHz in the High band. The frequency bandwidth control allows continuous variation from narrow to wide, and the level control offers a  $\pm 12$  dB continuously variable range. A Tone selector switches the parametric tone control into different output circuits. The unit has a rated output of 2 V (13 V maximum); THD at 2 V over the entire Phono to Pre Out signal path is 0.005 percent, 20 Hz to 20 kHz, with a phono



cartridge connected. The built-in MC head amp has an 88 dB S/N for a 500  $\mu$ V input, 0.02 percent distortion; its RIAA equalization deviation is a constant  $\pm 0.2$  dB, 20 Hz to 20 kHz. Price: \$450.00.

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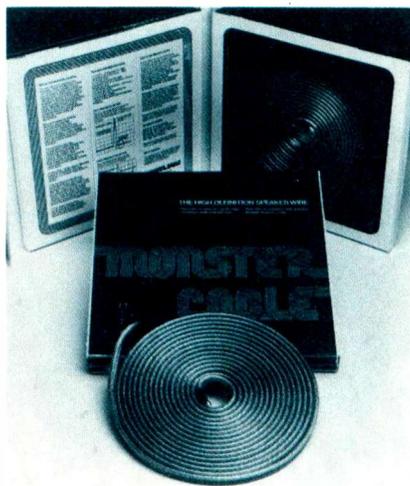
## Nikko Audio Receiver

Model NR-1219 delivers 100 W minimum per channel, with no more than 0.03 percent THD, and frequency response is specified to be from 20 Hz to 20 kHz. Among its features are d.c. power amplification, 12 LED power indicators, 12-dB-per-octave subsonic filter, 12-dB muting switch, Dolby FM, midrange tone control, tape dubbing, and a T-lock which automatically locks onto the center of an FM station. Price: \$649.95.

Enter No. 108 on Reader Service Card

## Monster Cable Speaker Wire

The Monster Cable, using a clear vinyl jacket, was developed to optimize connections between amplifier and speaker. It is made of over 500 fine copper strands in a rope-like construc-



tion that increases conductive surface area. Resistance is specified at 0.003 ohms per foot and capacitance at 21 pF per foot. Price: \$20.00 per 15-ft. pair.

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## ESTranslator Loudspeaker

Model 320 is a fully open, screen type for bipolar radiation, with a radiating surface area of 666 sq. in. It features electrostatic elements made of two plastic membranes surrounding one fixed plate. Each of the movable diaphragms works on half the input signal to double the excursion, or movement capability, of the element. Closely controlled spacing is maintained, and higher sound pressure levels can be produced with less power. The problem of reliability inherent in most electrostatic designs is circumvented through the use of a dielectric material in the ES element. If electrons, which create arcs, leave the fixed plate's surface, they travel through a

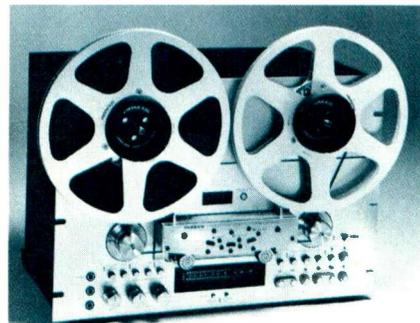


chloride-imbedded film that extinguishes the arc. Price: \$499.00.

Enter No. 110 on Reader Service Card

## Pioneer Open-Reel Tape Deck

Model RT-909 is a 3-motor, 4-head, auto-reverse open-reel deck which accepts both 10-in. and 7-in. reels. Its closed-loop, dual-capstan transport system provides complete control of the tape segment under the head assembly. The dual capstans and two oil-damped tension arms eliminate any interference that may be created by the take-up or supply reels, resulting in consistent tape velocity and reg-



ulated tension between the capstans. Logic circuitry prevents more than one control button being pushed at a time. The unit features a 4-track, 2-channel design, and the user can record on one or both of the channels. At 7½ ips, its specified S/N is more than 60 dB, harmonic distortion less than 1 percent, frequency response 20 Hz to 20 kHz, and wow and flutter 0.04 percent. Price: \$895.00.

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## ETCO Catalog

"Electronic Things and Ideas" is a free 64-page catalog of electronic parts, gadgets, and bargain-priced factory surplus, with many items not available in stores or from other equipment catalogs.

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# Soundcraftsmen

## THE EQUALIZATION LEADER...

WHY? Because WE CARE about HOW an equalizer does its job BEST!  
That's the reason for Our 10-POINT "TOTAL-SYSTEM EQUALIZATION"

YOU NEED MORE THAN JUST AN EQUALIZER... FOR OPTIMUM EQUALIZATION BENEFITS, HERE ARE THE TEN ESSENTIAL ELEMENTS YOU NEED:

**1 YOU NEED VISUAL ZERO-GAIN LEVEL INDICATION:** SOUNDCRAFTSMEN combination zero-gain controls with LIGHT EMITTING DIODE indicators to show when exact zero-gain is accomplished. Adjusting the zero-gain controls for equal L.E.D. intensity assures you of input vs. output level matching.

**2 YOU NEED FULL-SPECTRUM BOOST OR CUT CONTROLLABILITY:** SOUNDCRAFTSMEN'S "zero-gain" circuit provides an additional 18 dB control-range over the full spectrum 20 to 20,480 Hz on each channel for instantaneous input-output zero-distortion signal matching.

**3 YOU NEED AUTOMATIC/CONTINUOUS OUTPUT-OVERLOAD WARNING SIGNAL:** SOUNDCRAFTSMEN'S 2 top L.E.D.'s glow brightly, (bottom L.E.D.'s off), if output voltage is boosted excessively, thus eliminating the danger of distortion and/or damage to related equipment resulting from the high voltages that can be generated by any fine equalizer.

**4 YOU NEED A POSITIVE METHOD OF READING dB SETTINGS...**

**5 YOU NEED AT LEAST 30 dB TOTAL CONTROL OF EACH OCTAVE...**

**6 YOU NEED A UNIT THAT WILL ADD ZERO NOISE AND DISTORTION:** SOUNDCRAFTSMEN'S signal-to-noise and distortion performance figures are far superior to most high fidelity components. SOUNDCRAFTSMEN products are used in professional broadcast and recording systems, assuring you of completely noise-free and distortion-free integration into your system.

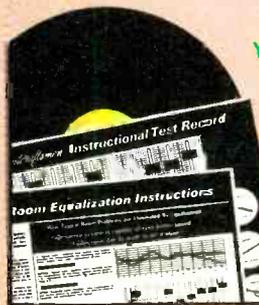
**7 YOU NEED TO BE ABLE TO LOOK AT YOUR ACTUAL "EQ" CURVES**

**8 YOU NEED THE ABILITY TO EQUALIZE TAPE RECORDINGS**



RP2215-R  
\$370<sup>00</sup>

SUGGESTED LIST PRICE  
INCLUDES WALNUT PANELS, 10-POINT SYSTEM, CHARTS, TEST RECORD



9

**YOU NEED AN ACCURATE, EASY-TO-USE INSTRUCTIONAL TEST RECORDING FOR ENVIRONMENTAL EQUALIZATION:**

SOUNDCRAFTSMEN includes a Test Record recorded and designed exclusively for SOUNDCRAFTSMEN equalizers. Without any expensive test equipment or technical knowledge you can quickly tune the acoustics of your room to  $\pm 2$  dB, just by following the announcer's step-by-step directions.



10

**YOU NEED A MEMORY SYSTEM FOR "EQ SET-RESET REFERENCING":** SOUNDCRAFTSMEN provides you with a quantity of "COMPUTONE CHARTS"

for recording the exact setting of each octave control for future reference and resetting. Automatic "Instant Memory Programming" is readily available by cutting off the "Computone Chart," holding against front panel, and moving up knobs into position.

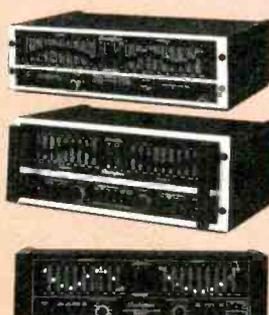
5 EQUALIZERS  
from \$248 to \$550

PRE-AMP EQUALIZERS  
from \$549 to \$899

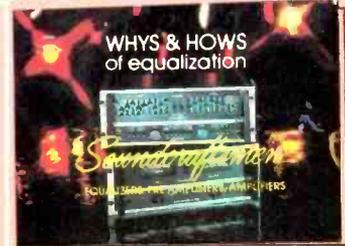
CLASS "H" 250 w. AMPS  
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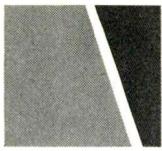
Includes TEST REPORTS, complete specifications, Class "H" amplifier ENGINEERING REPORT, EQ COMPARISON CHART, and the "WHYS & HOW'S" of equalization—an easy-to-understand explanation of the relationship of acoustics to your environment. Also contains many unique IDEAS on "How the Soundcraftsmen Equalizer 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!

SEND \$6.00 FOR EQUALIZER-EVALUATION KIT-1-1/2" LP TEST RECORD,  
1 SET OF COMPUTONE CHARTS, 1 COMPARISON CONNECTOR, 1 INSTRUCTION FOLDER

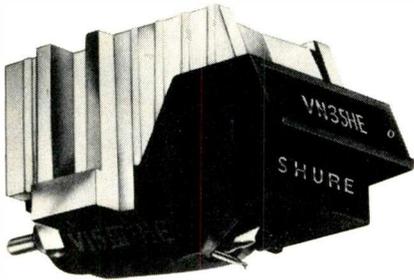


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**fact:**  
a new plus for  
the V15 Type III



**The Hyperelliptical  
Tip**

One of the critically acclaimed developments introduced in Shure's V15 Type IV phono cartridge was the Hyperelliptical nude diamond tip. This new design achieved a dramatic reduction of both harmonic and intermodulation distortion. Now the Hyperelliptical tip is also available in the V15 Type III Super-Track Plus Cartridge for sound purity and flat response at an eminently affordable price.

**Upgrade your  
present cartridge**

Replacing your present stylus with the new VN35HE improvement stylus will give your Type III cartridge the same specifications as the new V15 Type III-HE. The cost is extraordinarily low, yet the difference in sound will be immediately apparent.

**V15 Type III-HE**



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Bert Whyte

**Video  
scenes**



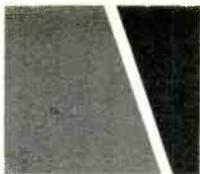
In the early days of the Consumer Electronics Show, the big-name TV manufacturers were well represented with elaborate and expensive displays. As color television became more commonplace and the emphasis at the CES shifted towards audio, the TV manufacturers decreased their participation in the Show to the point where, as recently as three years ago, they were conspicuous by their almost total absence. With the introduction of the video cassette recorder, all that changed, and now, once again, the TV biggies are back, displaying everything from VCRs to projection TV and color cameras, etc.

At the SCES in June, new video technology was in full bloom. New models of video cassette recorders vied for attention, and their rapid proliferation has astonished many industry observers. They point out, quite accurately, that no other electronic product they can recall has gone through as many evolutionary model changes in such a short period of time. Sony started it all off with their one-hour Betamax half-inch VCR. Matsushita's subsidiary JVC countered this with their longer playing VHS format. Various companies aligned themselves with either the Beta or VHS format, and it soon was apparent that the VHS forces dominated the field. There were several changes in the Beta format, which yielded a VCR capable of two-hour recordings. This was promptly

trumped by the VHS advocates who introduced a two-speed VCR which could record up to four hours. All this should have caused confusion for the consumer. It did...but to a much lesser extent than industry observers had expected. Evidently, the public was so intrigued and enamored with the VCR process that as long as their unit worked well and gave them a good picture, they were satisfied. Here too was that rare exception to the rule...the incompatibility of the Beta and VHS systems didn't seem to bother the VCR consumer.

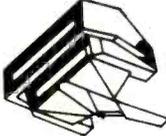
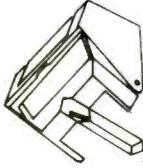
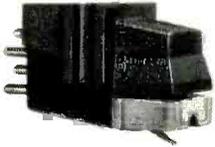
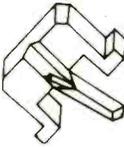
At the SCES, there appeared still newer VCR units, ones offering even more extended recording time. In the VHS camp there is the new RCA UDT-600 "Super Long Play" VCR, their Selecto-Vision brand which will afford six hours of recording on a 120 cassette, via yet another slower speed. That, of course, makes the seven-day programming feature even more practical. Since the RCA unit is an OEM product from Matsushita, naturally there is a similar long-play VCR from Panasonic. To obtain longer playing times on a VCR, this can be accomplished via a slower tape speed or a thinner base cassette tape or both. Perhaps needless to say, going the route of slower speed carries with it the penalty of poorer picture resolution. In truth, the loss of resolution is apparent to the critical viewer...but it isn't grossly poorer, so the consumer may

AUDIO • November 1979



# fact: a Genuine Shure upgrade stylus is unquestionably the biggest bargain in hi-fi

We strongly urge you to check your stylus for wear at least once a year to protect your records and maintain the highest standards of listening pleasure. Regardless of when (or where) you purchased your Shure cartridge, there is a Genuine Shure replacement stylus available which will bring your cartridge right back to its original specifications. Even better, *you may actually be able to improve its performance significantly over the original* with a Genuine Shure upgrade stylus... at surprisingly low cost! For example:

IF YOU OWN:	UPGRADE WITH:	THIS IS THE RESULT:
 <p><b>V15 Type III SERIES</b></p>  <p><b>M95 SERIES</b></p>	<p><b>VN35HE</b> Hyperelliptical stylus</p>  <p><b>N95HE*</b> Hyperelliptical stylus</p> 	<p>A dramatic reduction of harmonic and intermodulation distortion (formerly available only to owners of the incomparable V15 Type IV) is now possible with the V15 Type III and the M95 Series of cartridges simply by replacing the stylus. The Hyperelliptical stylus configuration contacts the record groove in a "footprint" that is longer and narrower than the popular Biradial tip design, making it pre-eminent for reproduction of the stereo-cut groove.</p>
 <p><b>M70 SERIES</b></p>	<p><b>N72EJ</b> Biradial (Elliptical) stylus <b>N72B</b> Spherical stylus</p> 	<p>Improved trackability, especially at high frequencies, due to a new, redesigned low-mass N72 stylus assembly.</p>
<p><b>ANY M91, M92, M93</b></p>	<p><b>N91ED*</b> stylus</p>	<p>Much improved trackability due to the lower effective tip mass of the nude Biradial (Elliptical) stylus tip. Less tracing distortion compared with a Spherical stylus tip.</p>
<p><b>ANY M71, M73, M75</b></p>	<p><b>N75 TYPE 2*</b> Series styli</p>	<p>Improved trackability at higher frequencies due to a stylus assembly with a lower effective tip mass.</p>
<p><b>ANY M44 Series</b></p>	<p><b>N55E*</b> stylus</p>	<p>Lower tracking force with a Biradial (Elliptical) stylus, lower distortion, lower effective tip mass.</p>
<p><b>M3D, M7D</b></p>	<p><b>N21D*</b> stylus</p>	<p>Improved performance at lower tracking forces.</p>

\* Before purchasing any replacement stylus be certain your turntable is compatible with the tracking force of the stylus you select.

**Always insist on a Genuine Shure replacement stylus.  
Look for the name "Shure" on the stylus grip.**

**Genuine Shure upgrade styli by**



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well be willing to accept this as "normal" for extended playtime. Now there is talk of a new yet thinner VHS tape, which it is claimed will give a picture of acceptable resolution with a playing time of *nine hours!*

The Beta forces weren't going to concede the battle of recording time to the VHS proponents, so Sony has come up with their new Model SL-5400, which will permit 4½ hours of recording on an L-750 cassette. Toshiba's new VCR, Model V-5425, goes even a step further than the Sony. The new VCR has the same two-speed operation as the Sony and also gets 4½

hours of recording from an L-750 cassette, but they also claim they can get five hours of recording using the thinner tape in the L-830 cassette. I'm willing to believe all this, except that I have yet to see an L-750 cassette, let alone an L-830, whose availability would seem very far off indeed.

As if this "war" between Beta and VHS weren't enough, now we have a new format to contend with. This is the "LVR" . . . Longitudinal Video Recorder. Actually, LVR is a sort of trade name for the BASF unit in this configuration, which they expect to introduce at the Berlin *Funkausstellung*



show this year. A more generic name for this system is "FHR" . . . Fixed Head Recorder. The Toshiba FHR uses an endless loop of half-inch tape, with 220 tracks, and affords a playing time of one hour. To get the necessary bandwidth for color, tape speed is 240 ips. In use, the endless loop of tape is always traveling in one direction and, of course, never has to be rewound. The tracks are "scanned" by the fixed head in a manner somewhat analogous to an 8-track audio cartridge. Among advantages cited for this unit is small size. The Toshiba prototype weighs only 17 lbs. and measures approximately 10 inches wide by 6 inches high by 13 inches deep. The unit is said to be far less complex than helical scan VCR units, with about a third fewer parts. Price is expected to be about half that of current VCRs. As you might imagine, detractors sneer at the one-hour playing time. Here again, thinner tape is said to allow up to two-hour recordings. Big advantage is claimed in replicating pre-recorded tapes in this format, since the tracks all run parallel to the direction of tape travel, and duplication can thus be accomplished in one pass. Boosters of this system say this is in contrast to regular helical scan tape copying which must be done in real time. Evidently these people either choose to ignore or don't know about the duplication system announced last year by Matsushita in which VHS (or Beta) cassettes can run off a four-hour dub in less than five minutes.

At this SCES, tremendous interest was generated by the video disc. In the form of the Philips/Magnavox Magnavision, the video disc can finally be acknowledged as a commercial reality. For years now there has only been the promise. To make sure you knew that the video disc had arrived, Magnavox's display had no fewer than 16 of their Magnavision players operating simultaneously. There seems to be a certain glamor connected with optical laser technology, and people are attracted to it without knowing very much about it. For example, detractors of the Magnavision system say that the particular laser they are using is bandwidth limited, and the reduction of the high frequencies results in loss of resolution and flawed color bal-

AUDIO • November 1979

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Get one of these albums free when you buy 3 Maxell UD-XL cassettes.

Anyone who appreciates great music is sure to appreciate these special recordings.

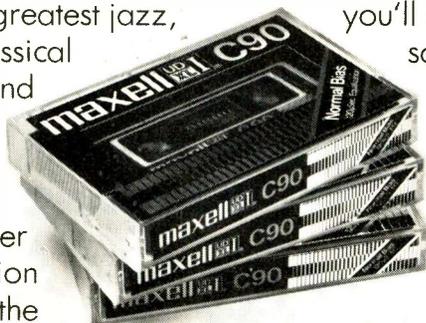
Each contains selected cuts performed by some of the world's greatest jazz, rock and classical musicians. And each has been specially selected under our supervision to bring out the

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All you have to do to get one free is buy 3 UD-XL I 90 or 3 UD-XL II 90 cassettes.

That way, you'll not only be getting some great tape, you'll also be getting some great

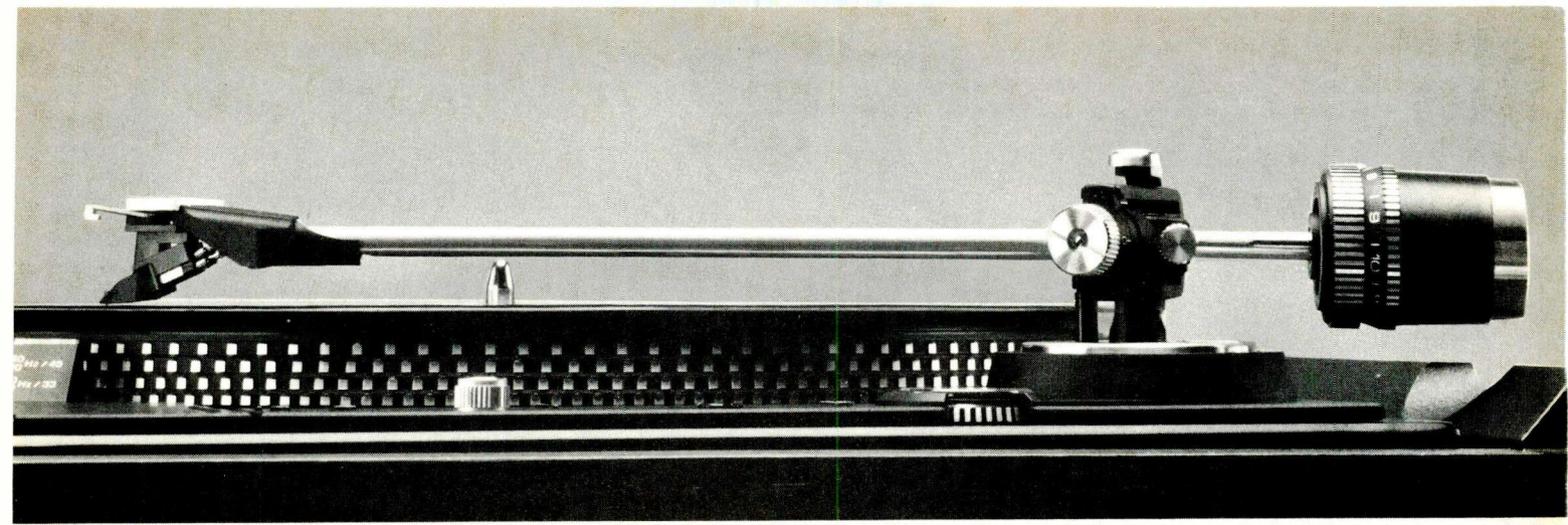
music to listen to. Offer good at participating dealers while supplies last.



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## All your records will sound better with Dual's new ULM tonearm and cartridge system.

*Even if they look like this.*

Although none of your records may be in such bad shape, many are probably warped enough to present serious problems to conventional turntables.

The high inertia of a typical tonearm and cartridge combination, with approximately 18 grams total effective mass, causes the stylus to dig in riding up the warp and to take off on the way down. Tracking angle and tracking force vary widely—as much as 30 percent. And a warp as small as 1.5 mm (which is barely discernible) can generate harmonic distortion of 2.7 percent. That's audible!

These problems have now been solved by Dual's new Ultra Low Mass tonearm and cartridge system.

The potential for this solution has existed ever since the development of Dual's dynamically-balanced tonearm with its gyroscopic gimbal suspension and straight-line tubular design.

Dual's research into the effects of mass on record playback led to a collaboration with Ortofon. A cartridge was developed with substantially less mass than any in existence. It weighs just 2.5 grams, including mounting bracket and hardware.

At the same time, the mass of the Dual tonearm was further reduced so that a perfectly matched tonearm and cartridge system emerged. Its total effective mass is just 8 grams. That's less than half the mass of conventional tonearm and cartridge combinations.

Tracking a record with the same 1.5 mm warp, the ULM system reduces harmonic distortion to only 0.01 percent. That's 270 times less than that produced by the conventional tonearm and cartridge.

Not only is the overall sound audibly improved, but stylus and record life are significantly extended.

To experience the demonstrable advantages of ULM, bring a badly warped record to your Dual dealer. Listen to it played with the ULM tonearm and cartridge. (All nine new Dual turntables feature this system.)

You will hear the difference that ULM can make on all your records.

For the complete ULM story, please write to United Audio directly.

ULM.

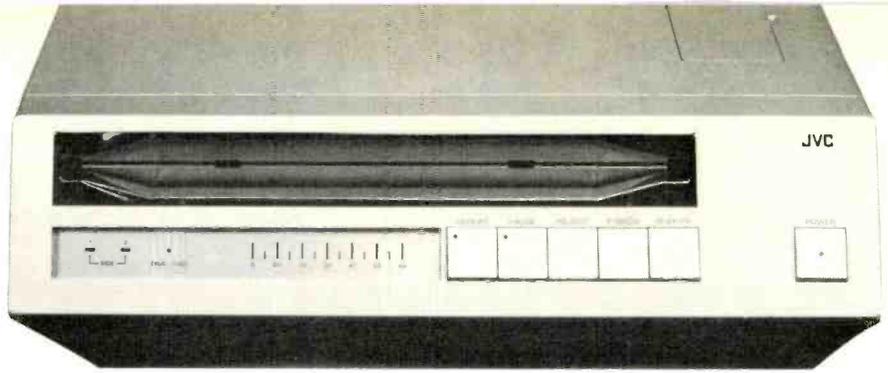
A major breakthrough in record playback technology.

**Dual**

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ance. To that, Magnavision can say "sour grapes!" . . . we are here witnessing a video-disc system that is for commercial sale. That is, indeed, a strong point.

In the meanwhile, none of the other participants in the video disc wars has thrown in the towel. On the contrary, RCA, JVC, and Matsushita are pushing ahead with their respective video discs. At the McCormick Inn, JVC was giving an impressive demonstration of their VHD (Video High Density Disc)/AHD (Audio High Density Disc) system. As you probably know, JVC's video disc is a grooveless capacitive



type, offering one hour of color video or digital sound per side. The master discs in the JVC process are "cut" with a laser beam. Actually the original signal is divided into two . . . one for re-

ording the main signal, the other for recording the tracking signals. The laser really "burns" microscopic pits on the disc, arranged in spiral tracks, with 54,000 tracks to a side. The disc revolves at 900 rpm, and the grooveless tracks are picked up by the capacitance stylus. The sapphire playback stylus has an electrode that detects the main program signals and the tracking signals. The tracking signals, recorded on both sides of the main signal, insure proper tracking of the grooveless spiral tracks. This control process allows a simple coil assembly to track the main signal while simultaneously making time-base corrections. The JVC capacitance-type video disc allows random access, slow motion, still picture, variable speed, and forward or reverse fast-motion, for all sorts of special effects.

One of the big features of the JVC disc is that it can very easily be produced in standard record presses, using normal record pressing technology. In using the disc, the fingers never come into contact with the surfaces, through use of an ingenious protective sleeve. When the sleeve with the disc inside is inserted into the disc player, the disc is automatically withdrawn from the sleeve and, at the conclusion of playback, is reinserted into the sleeve. The JVC VHD/AHD system is modular in concept. You can buy just the straightforward video player, if that is all you desire. You can also buy a random access module, which can be programmed for all the "trick" modes . . . slow motion, still picture, etc. Best of all, you can buy a PCM decoder module for use with the AHD digital disc . . . and for a price they claim will be under \$500!

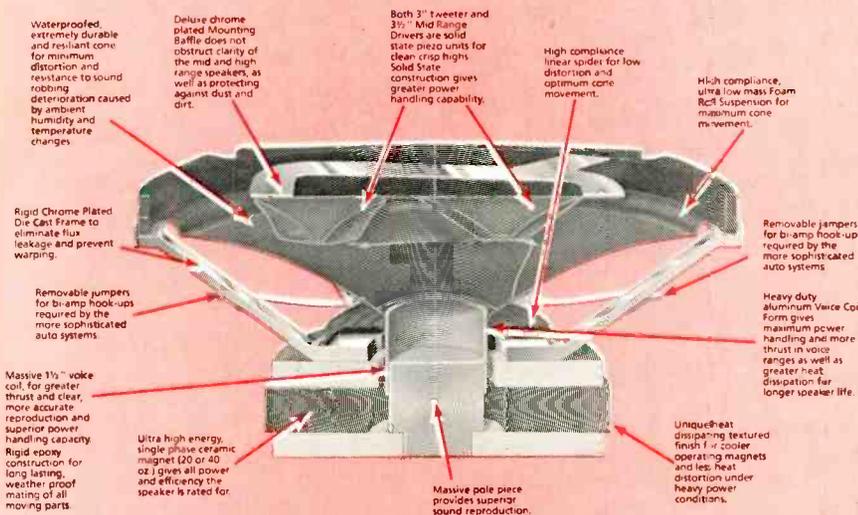
As for the demonstration itself, the results were superb. Picture quality was crisp and clean, with high resolution at the limits of the NTSC system. Color balance was absolutely stunning, with clean whites and accurate color values. The "special effects" module worked flawlessly, and we were treated to a true digital disc playback, which was exceptionally clean, wide in dynamics, and totally noiseless. I've seen very fine results with Matsushita's VISC system too. **A**



# TRUSONIC

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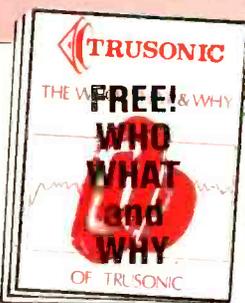
## HOW ABOUT PUTTING HALF A KILOWATT OF STEREO POWER IN YOUR CAR OR VAN?



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TRUSONIC is the only manufacturer of auto sound speakers having many unique features that make this possible. For example, we use solid state tweeters and mid-ranges that will handle all of the power your equipment is designed to deliver. Our massive 40 ounce magnet and 1 1/2" voice coil ensure the power rating and we back it up with a 5 YEAR LIMITED WARRANTY. Our chrome plated die cast construction prevents warping which results in distorted sound. THERE'S MORE TOO . . . Write to us at address above, or circle Reader number below.

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# LUX 5K50



## REDEFINING THE ART OF CASSETTE PERFORMANCE

For over half a century, the name Lux has meant advanced technology and sophisticated designs — qualities sought by dedicated music lovers around the world. And now, Lux's audiophile/engineers have focused their attention on the cassette format.

Some of the special features of the new 5K50: Real-time process DC amplifiers for both record and playback; a unique modular tape-transport system featuring three motors and separate three-head configuration; Lux's dual Plasma record level meter, and most significant, Lux's recently developed BRBS Variable Bias Control System.

Real-time processing DC circuits bring Lux quality amplification to the cassette format for extended bandwidth, low distortion and exceptional signal-to-noise ratios.

The highly sophisticated tape transport extracts the best possible performance from any cassette. . . and there's further improvement when Lux cassettes are used. Each of the three heads is precisely designed for its special task, as are the three motors that provide the separate drives for the dual capstans and reel hubs. The capstan drive motor is a quartz-referenced phase-locked loop direct-drive unit, while coreless motors for the reels provide total stability with the precise torque and tension required for an effective dual-capstan transport system.

When a Lux cassette tape is loaded, an electronic digital counter provides the exact minute and second of tape use. The

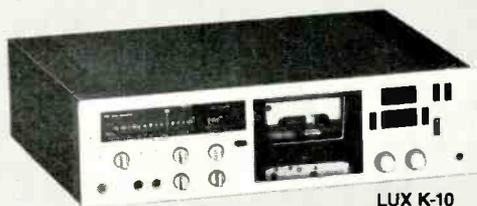
electronic counter functions normally for standard cassettes. A plasma fluorescent display indicates peak levels from -40 to +6 dB per channel with a special +10 dB scale for metal-particle tapes.

To eliminate the distortion caused by approaches in conventional bias circuitry, Lux developed the Bridge Recording Bias System. These special circuits enable the user to adjust the recorder for best possible response with any tape, while eliminating those components and circuits which in conventional decks cause transient distortion and phase shift.

And there is so much more. Electronic IC logic control with feather-touch pushbuttons replaces mechanical operation and its attendant noise and wear problems. Human engineered control clusters; record-head azimuth adjustment with built-in indicators for optimum setting for any tape; signal-to-noise ratios up to 69 dB and frequency response from 30 to 20,000 Hz, depending of course, on the tape used.

The expense of the Lux 5K50 cassette deck is fully justified, not only by what Lux puts into it, but by the performance the user can get out of it. Also look into the other Lux cassette decks, Models K-12, K-10 and K-5A, ranging in price from \$399.00 to \$995.00. . . each an embodiment of Lux quality.

To experience the Lux lineup of high-performance cassette decks, see your local Lux dealer or write to Mr. Robert Bowman, Vice President of Sales at Lux Audio of America Ltd.



LUX K-10



LUX K-5A



LUX K-12

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 160 Dupont Street, Plainview, NY 11803  
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# ..Interview/ Jim Metzner/ Sound

A conversation with the founder  
of a firm that produces  
"Portfolios of Photography and Sound."

Tom Bingham

The word "unique" is bandied about so frequently, it has virtually lost its meaning. Nevertheless, the products of a small Boston concern called Sound Image, Inc., are so removed from what one normally encounters, unique is the only word which accurately applies.

To describe what makes Sound Image productions unique, one need only refer to the company's slogan, "A Portfolio of Photography and Sound." All three Sound Image sets released to date (**Sound Image Number 1**, a collection of experimental sounds and photographs; **Greek Villages**, and **Bahia: Traditional Music and Moments of Brazil**) include a 12-in. stereo LP record along with a group of beautifully reproduced, well-printed, artistic, quality photographs. What's more, these sets aren't simply random pictures thrown together to accompany equally random sounds. The recordings and the photos are intended to be inextricably linked and produce an aural/visual whole.

Sound Image is the branchchild of recording engineer Jim Metzner. Although his academic background (Univ. of Massachusetts, Amherst) is primarily in ethnomusicology (the study of the music of foreign and ethnic cultures, including traditional folk and non-Western classical musics), Metzner has worked in sound recording for films and slide shows, mobile recording, and has lately put together a new concept for recorded walking tours (in cooperation with the Acoustiguide Corp. of New York). He is also a songwriter, who has recently composed the title song for the film "In Search of Ourselves," an anthropological documentary produced for the National Endowment and the Earthwatch Organization. His most recent project is a daily radio program, "You're Hearing Boston," on that city's WEEI-FM, and the content is obvious from the show's title.

Metzner's background, varied though it may be, does not seem too uncommon in its individual parts. Yet his interest in sound and recording eventually led (albeit somewhat indi-

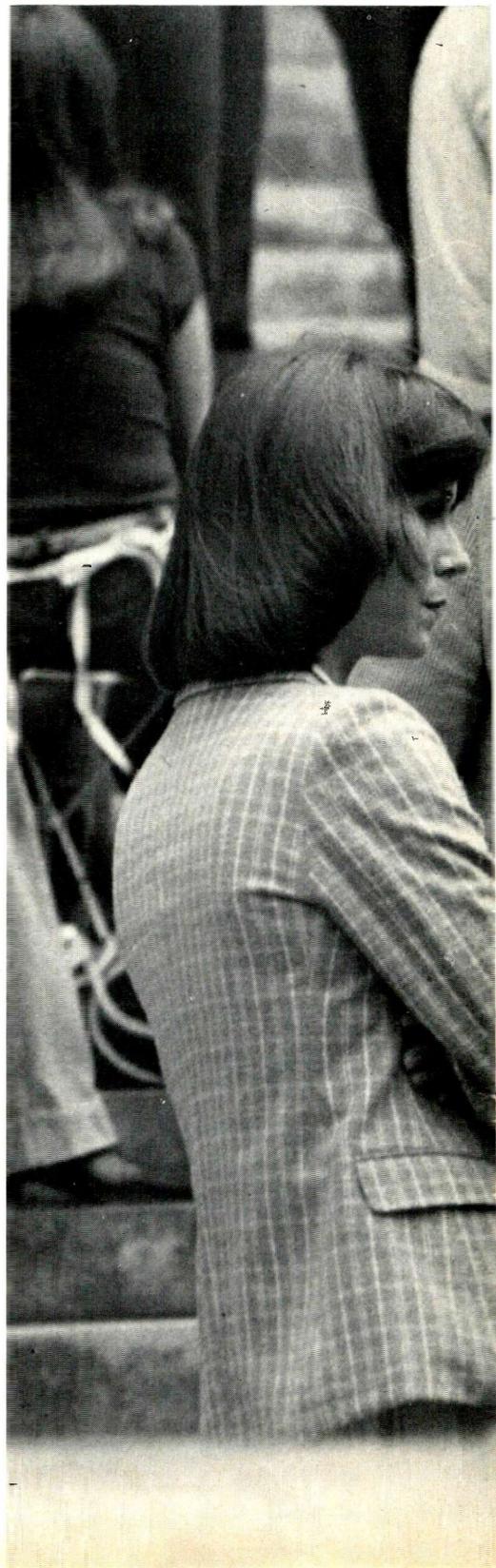
rectly) to the Sound Image concept. As Metzner himself traces it,

"I was very interested in sound, in listening, in other music besides Western music. I wasn't very much interested, frankly, in becoming a card-carrying academic ethnomusicologist. All I knew was that I needed to know what sound was. I was interested in how I listened or didn't listen; what recording seemed to be to me was a heightened way of listening, a way for me to explore and to question how I listen, maybe in the same way that a photographer questions how he sees or doesn't see. My first impression was how rarely I listened in life. Putting on a pair of earphones and attaching them to a tape recorder with the particular focus a microphone has was making me listen, or allowing me to listen, in another way, a new way.

"In school, I studied acoustics, music composition, ethnomusicology, and I started to record material that interested me, that I'd never heard before, things that surprised me either simply because of the way they sounded or how they affected me or whatever it was. And then, as I amassed material, I decided that some things seemed to want to belong together. And, of course, if they did belong together, but were different kinds of material, how would they be grouped together? What would the sequence be, the pacing of this material, and eventually what form would it take?

"Then the idea of a kind of 'magazine of sound' came to me, a collection of sound, where one listener could discover new worlds of sound. So far as I knew and am still able to tell, nothing like that existed. People received processed sound, mostly in the form of records, and most of that was music. The sort of material I was gathering wasn't only music. That material eventually became the recorded portion of **Sound Image Number 1**.

Jim Metzner interviewing Kate Jackson and Elliott Gould for his WEEI-FM radio series, "You're Hearing Boston."



AUDIO • November 1979

# Image.....



Photograph by Rick Stafford.



"I should say there was an event running concurrently with all this which very much influenced the final photography-and-sound format. It was an expedition in which I was involved one summer, in which a photographer named Minor White (he since has passed away, but he was a remarkable photographer; some of his photographs ended up in **Sound Image Number 1**), another fellow named Lee Ewing, who's a photographer and a friend of mine, and myself made an expedition across the country. We travelled up and down the coast of California, through Utah, New Mexico, and the Southwest, then back to Massachusetts. I was Minor's assistant when he went photographing, and I did recording as well for myself. This was the first time I'd been involved in something where there was recording and photography going on at the same time, and the wheels started turning. It was only much later that I could say

that summer was in part responsible for the format which **Sound Image** took. That was the *only* influence, but it was a strong one."

### Relating Sound to Photography

The audio portion of **Sound Image Number 1, 1975** ranges from electronic music to poetry readings by Robert Francis, from jazz by Bill Cole to a "sonata" for balloon by Margaret Rebar. There are also sound collages, such as one which compares the rhythm of a particularly vehement refrigerator motor with that of music from Madagascar. Another contrasts the sounds of children playing with a Delaware Indian skin dance. The sounds and photographs — some of which are obviously related to each other, though in other cases the connection between the recordings and corresponding visual images is much more subtle, less immediately perceptible — are arranged in a specific,

**A Greek musician photographed below the Acropolis during a festival of traditional music.**

numbered order. Metzner reminisces about the genesis of that album:

"The question is how a sequence of sounds could relate to a sequence of photographs; was there a way that they could mutually relate, reinforce, enhance, influence each other? Those were some of the questions I had in my mind. For me, **Sound Image Number 1** just asked a lot of those questions. I don't know if I consider it an answer; I consider the album an experiment in *asking* those questions. In fact, you could say that each volume of **Sound Image** was a different response, a different approach to that question.

"Here I was with a sequence of sounds. I decided to see if I could find

a sequence of photographs which could live with this sequence of sounds in an enlivening way. I did it because I did not believe at the time — and there were those who advised me, who also did not believe — that just an album of sound would be enough for people to accept. I now think that was a mistake on my part. I think people would have accepted and listened to the sound just on its own merit. However, I soon became very much interested in choosing this sequence of photographs, because they had to stand on their own as a sequence of photographs, just as the sounds did, and the sounds and the photographs had to relate to each other. I ultimately became very interested in how sound, in fact, relates to photography.

“One thing I was trying to look for were images which remained interesting. Obviously, the images were static; we’re not looking at moving, instant images, such as a movie that’s changing all the time or a slide show. We’re looking at a static image. Yet a good photograph has the quality of being able to allow the eye to roam over it, to spend a great deal of time. Great photographs you can come back to. You can say the same about a great sequence of sounds, be it music or just pure, ambient sound. You can listen to it again. It may operate on many different levels. It may have a quality of sound, the moment may be extraordinary enough, that you can come back to it again and again.”

Among the more intriguing items on **Sound Image Number 1** are a clicking radio signal emitted by a pulsar some 1500 light-years from Earth and a segment featuring an Aeolian harp. Metzner discusses the latter in some depth:

“The Aeolian harp happened to be an instrument I built and experimented with. One of the things you’ll hear on the recording is a duet between an Aeolian harp and a guitar. The Aeolian harp is a stringed instrument played by the wind; this particular model was window-sized. I was living in an apartment in Easthampton at the time. I placed this Aeolian harp in the window and would play harmonics on my guitar about 10 feet away from it. What I discovered was that at an optimum distance from the harp, there would be a resonance between the harmonic and the note being played by the wind over the harp’s strings. The note played on the guitar lasted much longer than it normally would without the harp, and vice versa. The sustain on the harp, you could hear that particular frequency being rein-

forced by the guitar. And it was like playing with the wind, playing with Aeolus, God of the Wind, if you want to be Romantic about it! I recorded a lot of that and edited it down to the sequence that’s on the record.

“The pulsar was another thing I’d stumbled upon which fascinated me. I mean the idea this sound was the radio source signal of a star was incredible — that it was *that* old, the time involved for this sound to reach Earth’s receiving apparatus.

“There was one exception in the process of selecting the sequence of sounds. At one point, I ran into composer Daniel Pinkham, best known for choral pieces and also his synthesizer music. He was very much interested, as I was, in composing a piece for a photograph. I had a number of photographs with me, among them being one by Andre Kertesz (Image 15), and Mr. Pinkham composed the piece, *August Landscape*, with the photograph and Sound Image in mind.”

of Greek traditional music for the Society for the Dissemination of Greek Music. I wrote to her and Constantine wrote to her, and she said that she would be agreeable. And so our relationship was entirely through the mail; she would send us some recordings and Constantine and I would respond back to her about the sequence or about the choice. Everything in that album fell together pretty nicely at that stage; I think I only asked her to change one piece.

“But she and I have very different views about what the recording of traditional music can be. The recordings on the **Greek Villages** album are all studio quality, very pure, no interference at all from any ambient sound. It could have been and probably was recorded under studio-type conditions. The **Bahia** album is, in a way, exactly the opposite of that. There may be one cut, *Ser-Tao*, on side two, of studio quality, done in conditions close to a studio.



**“Ambient sound is as much a part of a culture as music. And one can really get a feeling of the rhythms of a society, of the way it works, from the sounds of that society.”**



The second Sound Image set, **Greek Villages**, documents the rapidly disappearing traditional folk music of Greece. The photographs likewise represent scenes of a way of life which is fast being supplanted by modern civilization. As Metzner recalls,

“**Greek Villages** came into being when I was looking for material for **Sound Image Number 1**. I had approached Constantine Manos, a Boston-based photographer, for material for the photographic sequence in that album. He brought me the idea of an album which would feature some of his hitherto unpublished photographic work done in Greece and the recordings of Mary Vouras, a woman whom he had met there and had known over the years. He had always felt her work was the audio equivalent of what he was doing, and apparently she had felt the same thing from her perspective. Mary Vouras is an American-born woman of Greek descent who’s been living in Greece, working as a collector

#### **Studio vs. Live Recording**

“The rest of **Bahia** was all recorded live on purpose. My feeling is that the ambient surroundings contribute to the life of the recording, in fact become an integral element in the recording, not an interference or a gimmick, as some people might look at that kind of thing. I think this is true of popular music, the difference between a live album and a studio album, right? There are some groups that just get it on live and can’t do it in a studio. In traditional music, the same laws apply. I mean, the four walls of the studio are a very cold place. It’s a lot different than playing ‘out there’ where maybe that music is meant to be — *especially* in traditional music.

“Obviously, it depends on the circumstances. If you’re going to be recording in the middle of the freeway, it’ll be a little tough! I’m not interested in being surrounded by cars. It was such a challenge, in many of the recordings that were done in Brazil, es-





.....

**“Recording seemed to be a heightened way of listening, a way to explore and to question how I listen.”**

.....

tellectual knowledge. I’m speaking about information that one can respond to with feelings as well, perhaps even with one’s senses. On one level, passing along, communicating, aspects of tradition, the very rich musical traditions of Brazil and Greece, communicating visually certain aspects of the quality of traditional life there. I think the albums have succeeded in giving a real taste of the underlying current of what I call traditional life there. This is the life which is the pulse of these countries, irrespective of what their political system is at the moment. This is something which, like a pulse, continues, and the albums are a testament to that. In the first album, my aim was to call to question how we see, how we listen, and how those two senses can co-relate. In some way, those aims continued through to the second and third albums as well.”

Metzner freely admits that Sound Image, Inc. is an experiment. Like so many other experiments in the co-existing worlds of sight and sound, it will no doubt captivate a small, yet devoted audience, while most people will simply ignore it. Nonetheless, Jim Metzner has already set a high standard for future ethnomusicologists to attain in their documentation of folk cultures. At the same time, he offers a new perspective regarding the separateness of our five senses. Sound Image is an engrossing and (if you’ll permit me) unique concept which appears to have great potential. 

The Sound Image sets are available in a few stores, though most of the distribution has been through mail-order. Write to Sound Image, Inc., Box 550 Kenmore Station, Boston, Mass. 02215. Their cost, \$12.50 each, may seem a bit steep until one examines the quality of the overall production. As Metzner explains,

“They’re very difficult things to market. They’re not just records; their price reflects a price which is not just a record. We’ve tried to communicate that fact by putting stickers on the outside of the shrink-wrap or plastic bags the albums are contained in, saying ‘these have photographs’ and so forth. But if they’re not displayed properly, people who are coming up to the albums for the first time don’t understand that they contain a folio of photographs, really beautifully printed photographs. Or they don’t understand the price of printing today. The

quality of printing we do with the albums is the best printing done in art books. People understand when they buy an art book and have to pay a certain price for it, they’re paying for printing, the quality of paper, etc. Somehow people have a different view when they’re buying a record.”

It should be noted that Jay Maisel’s 12 photographs for **Bahia** are in color. The photos in **Sound Image Number 1** and **Greek Villages** are black and white, but are of an equally high standard.

What does Metzner hope to accomplish through Sound Image, Inc.?

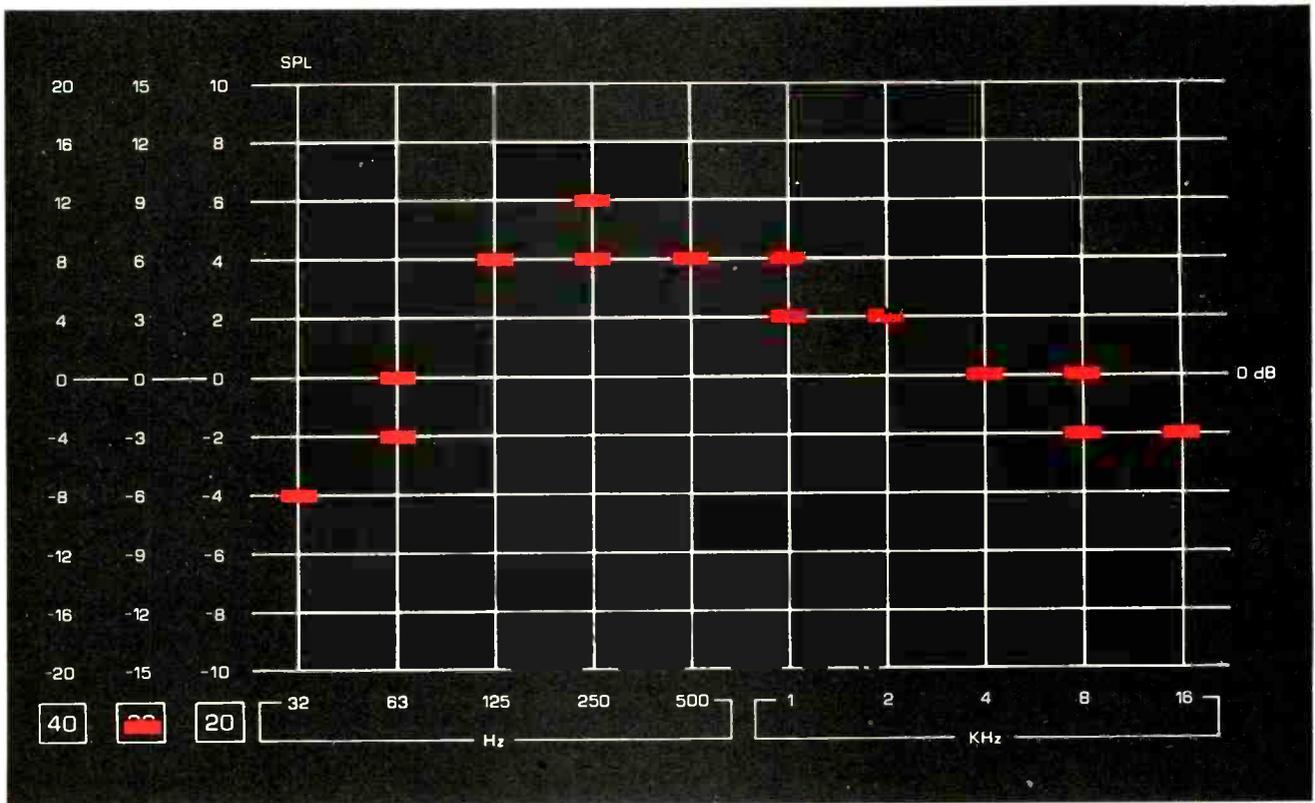
“My aim in producing the Sound Image series has not been profit. My aim has rather been to share, to communicate a quality of, oh, ‘information,’ I guess you could call it. But in this instance, I’m not speaking about information in the way we usually associate that word — facts, figures, in-

50



Each Sound Image production contains a record album as well as a folio of photographs.

# Now hear this.



51

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Peak reading dB level

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# Directory of Tape &

## Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes							8-Track			Open Reel				
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes		
AMPEX	Grandmaster I	Normal		X												4.60	Also 2500 ft., 28.70.	
					X											6.00		
									X									4.10
											X							5.00
												X						10.90
													X					12.50
														X				33.10
	Grandmaster II	High		X												5.20		
					X											6.60		
	20/20+	Normal	X													3.00		
				X												3.40		
					X											4.70		
						X										6.60		
									X							3.50		
										X						4.40		
												X				9.20		
	Plus 371	General	Normal	X												1.70		
					X											2.10		
						X											3.50	
							X										5.20	
										X							2.90	
											X						3.50	
													X				7.40	
	352	General	Normal											X		9.20		
X														1.20				
				X											1.60			
					X										2.40			
AUDIO MAGNETICS	Tracs	General	Normal	X											1.19	Also 2400 ft., 6.49.		
					X										1.19			
						X											1.79	

# Ancillary Equipment

## Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes									8-Track			Open Reel			
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes			
AUDIO MAGNETICS (continued)	Tracs	General	Normal				X										2.09		
										X							1.89		
												X							2.29
														X					5.89
															X				6.29
	High Performance	Music	Normal	X													4.19		
					X												4.99		
						X											5.99		
							X										6.99		
										X							2.59		
												X					3.29		
	High Performance II	Music	High													4.99			
						X									5.99				
	BASF	Professional I	Prof.	Normal		X											3.49		
							X										4.99		
Professional II		Prof.	Chrome	X												3.89			
						X										5.29			
Professional III		Prof.	FeCr	X												3.89			
						X										5.29			
Studio I		Studio Master	Normal		X											3.29			
						X										4.69			
Studio II		Studio Master	Chrome	X												3.49			
						X										4.99			
Performance		Voice	Normal	X													2.49	Also 2400 ft., 9.99.	
					X												2.69		
						X											3.79		
							X										4.99		
									X							2.89			
											X					3.49			
													X			7.49			
														X		15.99			

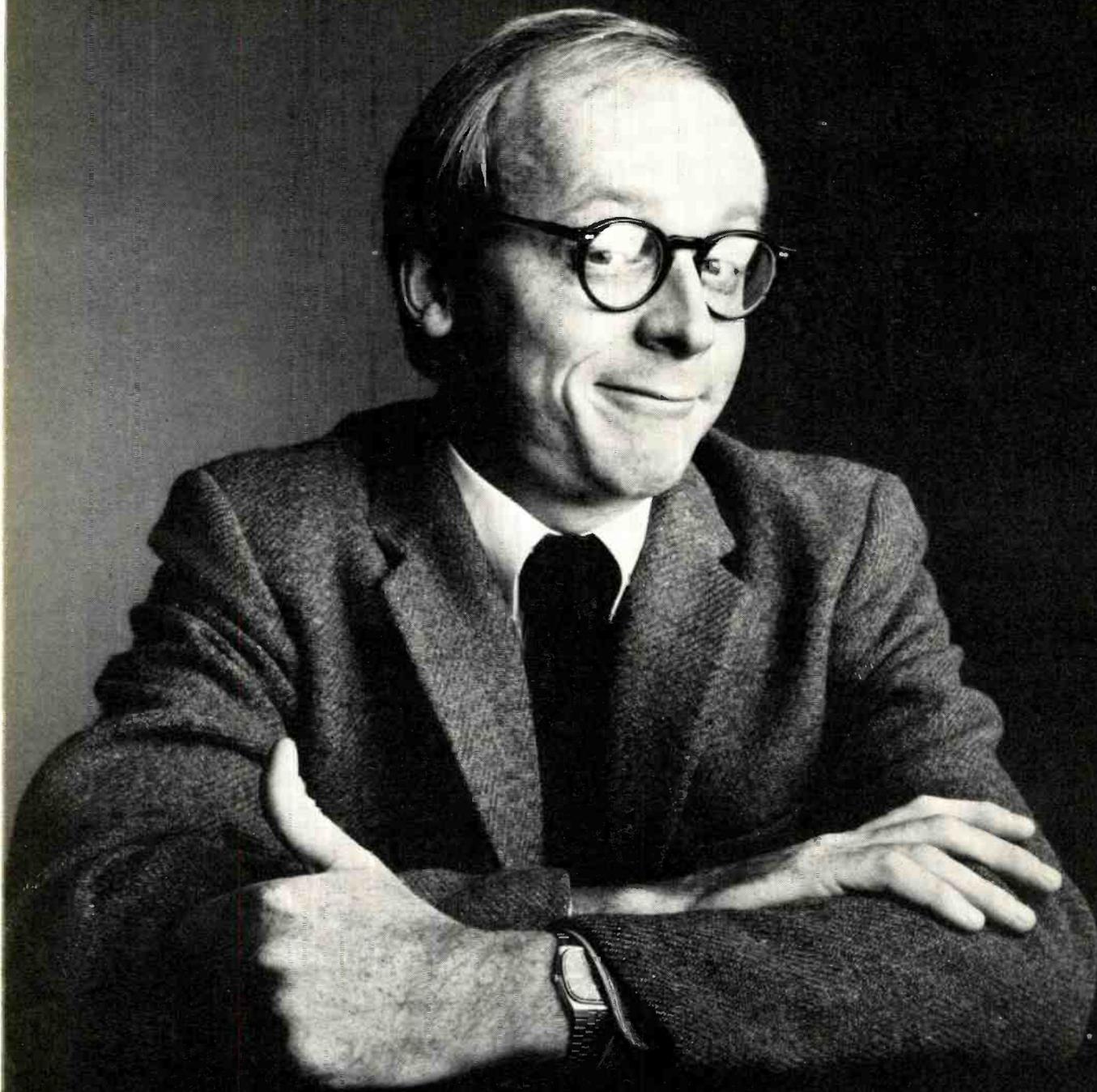
# Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes							8-Track			Open Reel					
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes			
BASF (continued)	Studio	Studio	Normal						X							3.29	Also 2400 ft., 14.99.		
												X				3.99			
													X					9.99	
	Professional														X	19.99			
													X					14.99	
														X					29.99
CAPITOL	The Music Tape	General	Normal	X												1.99	Also 100 min., 3.19; 120 min., 3.79.		
					X													2.49	
						X													3.69
										X									2.49
												X							2.79
													X						2.99
CERTRON	High Energy	Music	Normal		X														
						X													
							X												
COMSETTE	Tru-2-Life Yellow	Music	Normal		X											2.79			
						X										3.99			
							X									5.59			
	Tru-2-Life Blue	Music	Normal		X											2.09			
						X										2.99			
							X									4.19			
	Tru-2-Life Green	Music	Normal		X											1.59			
						X										2.29			
							X									3.19			
EMI	Super	Studio	High									X				24.95	†On an NAB reel.		
													X			25.95			
														X†		59.95			
	Standard		Normal		X											2.95			
						X										4.50			
							X									5.85			
	Super		Normal		X											4.40			
						X										6.50			
							X									8.70			
	High Fidelity		Normal		X											5.75			
						X										7.75			
							X									9.95			
FUJI	Metal		Metal	X†											8.80	†C-46.			
					X										10.00				
	FX-II		Chrome	X†										4.40					

56

# Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes							8-Track			Open Reel			
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes	
FUJI (continued)	FX-II		Chrome	X											5.00		
					X									6.90			
	FX-1		Normal	X†											4.00	†C-46.	
					X									4.70			
						X									6.20		
	FL		Normal	X†											3.00	†C-46.	
					X										3.40		
						X			X						4.70		
	FB-151	Studio Master	Chrome									X			12.25		
													X		15.85		
													X	43.20			
FUJI		Normal						X						4.20			
										X				5.60			
HITACHI	UDEX	Studio Master	Chrome	X											4.00		
						X									5.50		
	UDER	Music	Normal	X											4.00		
						X									5.50		
	LN	Speech	Normal	X											2.00		
					X										3.10		
INTER-MAGNETICS	XL	Music	Ferric	X													
						X											
							X										
								X†									
	Laser UHD/1	General	Ferric	X													
					X												
3M	Scotch Metafine	General	Metal	X†											6.25	†C-46.	
					X										6.95		
						X											8.95
	Scotch Master III	General	FeCr	X											4.19		
					X										4.49		
						X											5.69
	Scotch Master II	General	Chrome	X											4.19		
					X										4.49		
						X											5.69
	Scotch Master I	General	Normal	X											3.59		
				X											3.87		
					X												5.09



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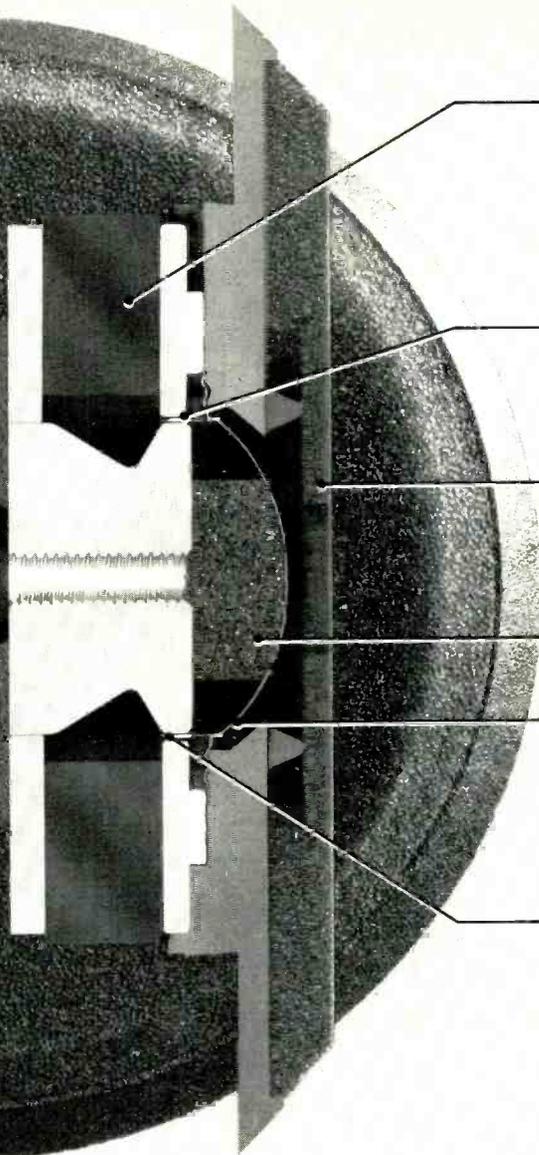
# Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes										8-Track			Open Reel	
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes		
MAXELL (continued)	LN-8T	Music	Normal							X†								†46 min.
											X							
												X				4.95		
	UDXL	Prof.											X					Also 2500 ft., epitaxial cobalt; back coated.
														X		14.00		
															X		38.50	
MEMOREX	MRX <sub>3</sub>	General	Normal	X													2.79	
					X												2.99	
						X											4.49	
							X										5.99	
								X†									2.59	
	8-Track	General	Normal							X								2.99
											X						3.29	
												X					3.59	
	High Bias	General	High			X											4.39	
							X										5.99	
MR. CASSETTE	Correct Replacement-DE	Studio Master	Normal		X												4.50	
						X											6.00	
							X										8.25	
	Correct Replacement-HEER	Music	Normal			X												3.00
							X										4.50	
								X									6.75	
	Correct Replacement-LN	General	Normal			X												2.50
							X										3.50	
								X									5.50	
	Grandmaster	Studio Master	Normal			X											6.00	
	Grandmaster	Studio Master	Chrome										X				100.00	
	Toyota	Studio Master	Normal			X												3.00
							X										4.50	
							X									6.00		
NAKAMICHI	ZX		Metal		X												9.75	
	SX		Chrome		X												5.50	
						X									7.20			
	EX II		Normal		X												5.20	
						X										7.00		
	EX		Normal		X													4.50
					X										5.80			

# Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes							8-Track			Open Reel						
				C-45	C-60	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes				
RKO	Broadcast I		Normal		X											3.79				
							X									5.75				
	Audition XD	General	Ferric	X													2.85			
					X												3.15			
						X												4.40		
RADIO SHACK	Concertape		Ferric		X												2.59			
						X											3.59			
							X											4.99		
								X†										1.99	†C-30.	
														X				1.95		
	Realistic		Ferric		X													1.89	Also 2400 ft., 5.49.	
						X												2.59		
							X											3.19		
								X†										1.49	†C-30.	
														X				4.49		
	Supertape		Ferric									X					4.99			
												X					5.59			
														X			9.99			
	Supertape Gold				X												2.59			
						X												2.99		
						X												3.49		
							X											3.99		
Supertape Chrome					X											2.99				
						X											3.99			
SONY	FeCr	Music	FeCr	X													4.20			
					X													4.60		
						X													5.90	
															X				14.00	Back coating.
																X			39.00	As above, with NAB hub, metal reel.
	EHF	Music	Chrome		X													3.60	Cobalt-absorbed ferric.	
						X													4.00	
							X													5.60
	SHF	Music	Normal		X													3.30		
						X													3.70	
							X													5.00
	HFX	Music	Normal		X													2.90		
						X													3.10	
							X													4.40
							X												6.00	

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tweeter  
to match  
a high  
performance  
speaker  
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- Foam damper smoothes response in the upper octave.
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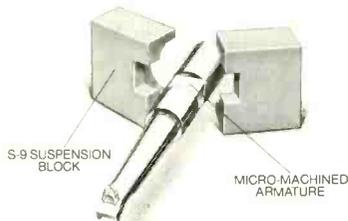
**interface®**

# Blank Tape

MANUFACTURER	Brand	Principal Type of Use	Recommended Bias Level	Cassettes								8-Track			Open Reel		
				C-45	C-90	C-90	C-120	Other	45 Min.	60 Min.	90 Min.	1200 ft.	1800 ft.	3600 ft.	List Price	Notes	
SONY (continued)	LNX	General	Normal	X												1.95	
					X										2.15		
						X										3.10	
							X									4.00	
	8T	Music	Normal						X							3.30	
											X				4.20		
	ULH	Music	Low									X				9.00	
												X			11.50		
														X		31.00	
	TDK	MA-R	Music	Metal		X											
SA		Music	High		X											5.00	
						X									7.10		
Audua-AD		Music	Normal	X												3.60	
					X										3.85		
						X									5.60		
							X								7.75		
D		General	Normal	X												2.50	
					X										2.75		
						X									3.85		
							X								4.75		
									X†								†C-30, 2.25; C-180, 6.75.
Audua-LB		Music	High/Normal										X			14.40	
														X		39.10	
Audua-L		Music	High/Normal										X			9.50	
													X		11.75		
													X		33.25		
S	General	Normal										X			9.60		
													X		23.25		
Audua-AD8	Music	Normal							X						5.00		
											X				6.60		
D8	General	Normal							X						4.15		
												X			5.00		
TSI	TSI-Agfa	Music	Ferric	X												1.89	
					X										2.19		
						X										2.69	
							X									3.19	
	TSI-Concert	Music	Ferric	X												1.69	
					X										1.99		
						X										2.49	
							X									3.00	

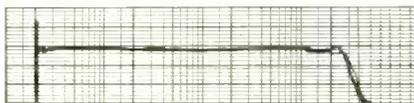
64

We can. Thanks to the revolutionary Omni-Pivot System™ in our new ADC Improved Series cartridges. We can also honestly say ADC has never sounded better. Definition and stereo separation are incredible. Even the most complex musical passages are reproduced in full detail with absolute neutrality.



The new Omni-Pivot System™ is a major advance in micro-technology. There are no restrictive armature governors, wires or

adhesives. Instead, each armature is micro-machined to perfectly lock into a newly formulated S-9 high definition suspension block. We think it's a real breakthrough. But we'd like you to be the judge.



Above is the frequency response of a new ADC ZLM Improved cartridge. The wider and flatter the response, the better it is. Do we have to state the obvious? We didn't think so.



Now look at the same cartridge after 1000 playing hours. See

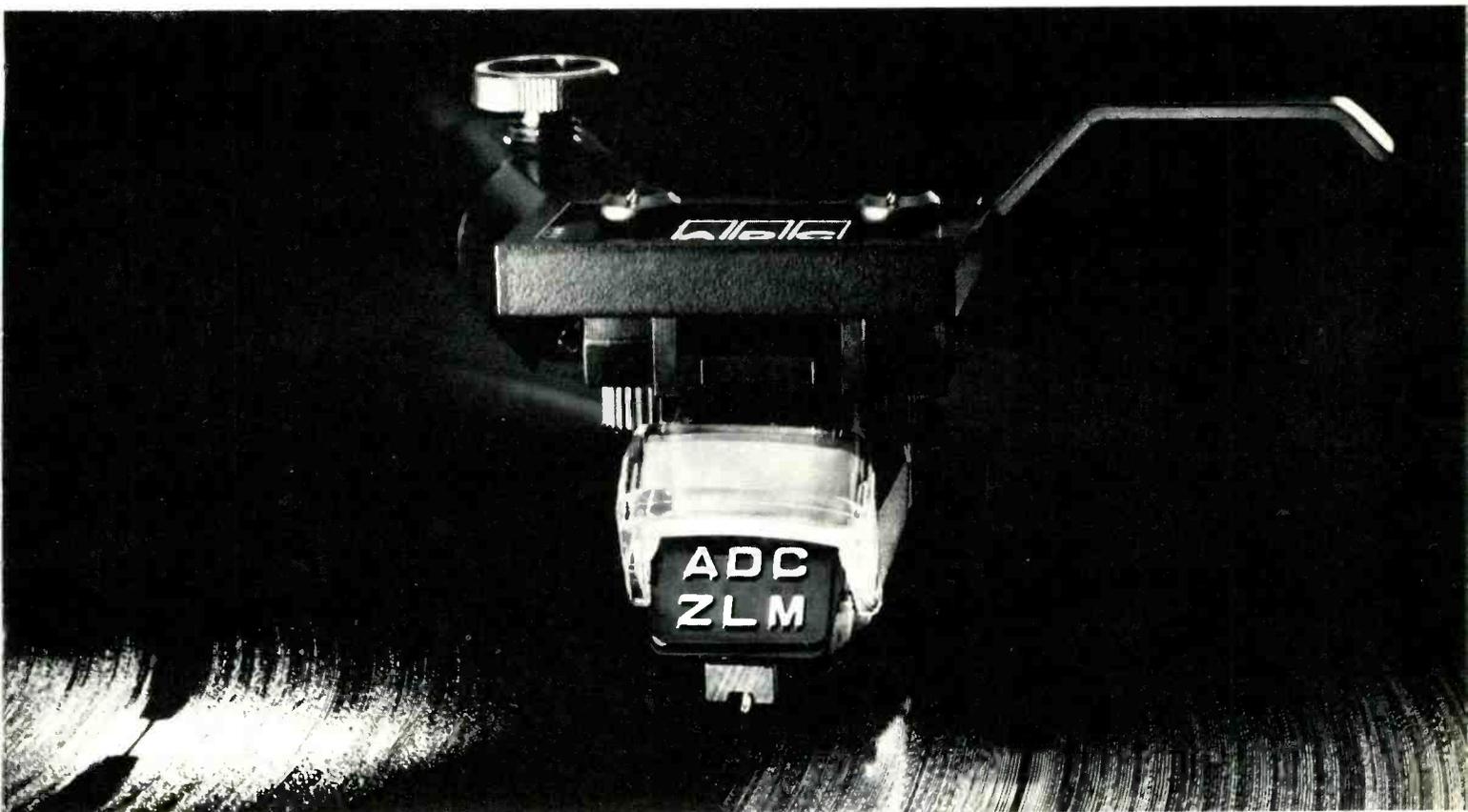
any difference? You won't hear any difference either. The ADC ZLM Improved cartridge showed less than a 1dB change in response after 1000 hours!

Now the good news gets even better. The Omni-Pivot System™ comes in a wide range of new ADC Improved Series cartridges. The ZLM, XLM MKIII and MKII, and QLM-36 MKIII. All featuring new snap-down stylus protectors.

If you already own a fine ADC cartridge, the Omni-Pivot System™ is yours for just the price of a replacement stylus.

Listen to any new ADC Improved cartridge. After you've heard us, we'd like to hear from you. Write Audio Dynamics Corp., Pickett District Rd., New Milford, Ct. 06776, or call our toll-free number (800) 243-9544.

## CAN YOU HONESTLY SAY YOUR CARTRIDGE WILL STILL SOUND NEW 1000 PLAYING HOURS AFTER YOU BOUGHT IT?



**ADC**  
A BSR COMPANY

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# Directory of Manufacturers

## A

**ADS**  
1 Progress Way  
Wilmington, Mass. 01887

**Ace Audio**  
532 Fifth St.  
East Northport, N.Y. 11731

**Adcom**  
11A Jules La.  
New Brunswick, N.J. 08901

**Advent**  
195 Albany St.  
Cambridge, Mass. 02139

**Allison Acoustics**  
7 Tech Circle  
Natick, Mass. 01760

**Ampex**  
401 Broadway  
Redwood City, Cal. 94063

**Audio Aids**  
See: Audio Works

**Audio Groome**  
See: Empire Scientific

**Audio Kare**  
See: Hammond Industries

**Audio Magnetics**  
P.O. Box B-G  
Irvine, Cal. 92716

**Audio Pulse**  
4323 Arden Dr.  
El Monte, Cal. 91731

**Audio Works**  
840 Piner Rd., #14  
Santa Rosa, Cal. 95401

**Audionics**  
10950 S.W. Fifth Ave.  
Suite 160  
Beaverton, Ore. 97005

## B

**BASF**  
Crosby Dr.  
Bedford, Mass. 01730

**Bang & Olufsen**  
515 Busse Rd.  
Elk Grove Village, Ill. 60007

**Brahma Research**  
P.O. Box 74  
Woodstock, Ga. 30188

## C

**Capitol Magnetic Products**  
P.O. Box 2391  
Los Angeles, Cal. 90028

**Certron Corp.**  
1701 S. State College  
Anaheim, Cal. 92806

**Cerwin-Vega**  
12250 Montague St.  
Arleta, Cal. 91331

**Comsette Corp.**  
12417 W. Olympic Blvd.  
Los Angeles, Cal. 90064

## D

**dbx Inc.**  
71 Chapel St.  
Newton, Mass. 02195

**Decca**  
See: Rocelco

**Discwasher**  
1407 N. Providence Rd.  
Columbia, Mo. 65201

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

## E

**EMI**  
See: Empire Scientific

**Empire Scientific**  
1055 Stewart Ave.  
Garden City, N.Y. 11530

**Esoteric Audio**  
See: Brahma Research

## F

**Fuji Photo Film**  
350 Fifth Ave.  
New York, N.Y. 10001

## G

**Goldring**  
See: Hervic Electronics

## H

**Hammond Industries**  
155 Michael Dr.  
Syosset, N.Y. 11791

# Yamaha decks

## TC-720. The 3-head deck for the creative recordist.

If you like to get involved with your tape recording, this is the deck for you. The bias rotary control and built-in pink noise generator allow you to fine-adjust the deck's high frequency response to best suit the particular tape you are using. The REC LEVEL ADJ controls and REC CAL switch allow you to further adjust the recording sensitivity for proper Dolby\* NR tracking, resulting in very high signal-to-noise ratio and exceptionally clean sound. The TC-720 also has a unique built-in "real time" echo facility.



You can use this to add new dimensions of studio realism to tapes recorded for playback in both your car and your home. All these front panel features (and more) are backed by reliable, advanced electronics. The Closed-Loop Dual Capstan Drive keeps the tape at an ideal tension for smooth head contact. An advanced Frequency Generator servomotor transports the tape at a constant, accurate speed with very high torque. High-performance, low-noise amplifying circuits are used for the mic and line inputs. All this superior performance is wrapped in a beautiful simulated ebony cabinet.

**Hervic Electronics**  
18750 Oxnard, #406  
Tarzana, Cal. 91356

**Hitachi Sales**  
401 W. Artesia Blvd.  
Compton, Cal. 90220

I

**InterMagnetics**  
1311 Colorado Ave.  
Santa Monica, Cal. 90404

L

**LT Sound**  
P.O. Box 1061  
Decatur, Ga. 30031

M

**3M Co.**  
600 Third Ave.  
New York, N.Y. 10016

**MXR Innovations**  
247 N. Goodman St.  
Rochester, N.Y. 14607

**Maxell**  
60 Oxford Dr.  
Moonachie, N.J. 07074

**Memorex**  
1600 Memorex Dr.  
Santa Clara, Cal. 95052

**Mr. Cassette Industries**  
24-64 Crescent St.  
Suite 2  
Astoria, N.Y. 11102

N

**Nakamichi U.S.A. Corp.**  
1101 Colorado Ave.  
Santa Monica, Cal. 90401

P

**PSB Speakers**  
P.O. Box 144  
St. Jacobs, Ont.  
Canada NOB 2N0

R

**RG Dynamics**  
4448 W. Howard St.  
Skokie, Ill. 60076

**RKO Tape**  
3 Fairfield Crescent  
West Caldwell, N.J. 07006

**Radio Shack**  
1400 One Tandy Ctr.  
Fort Worth, Tex. 76102

**Reference Monitor**  
2380 "C" Camino Vida Robel  
Carlsbad, Cal. 92008

**Rocelco**  
1669 Flint Rd.  
Downsview, Ont.  
Canada M3J 2J7

S

**SAE**  
701 East Macy St.  
Los Angeles, Cal. 90012

**Sansui**  
1250 Valley Brook Ave.  
Lyndhurst, N.J. 07071

**Sony**  
9 W. 57th St.  
New York, N.Y. 10019

**Sound Concepts**  
P.O. Box 135  
Brookline, Mass. 02146

**Sound Saver**  
See: Transcriber Co.

**Source Engineering**  
P.O. Box 506  
Wilmington, Mass. 01887

T

**TDK**  
755 Eastgate Blvd.  
Garden City, N.Y. 11530

**TSI**  
Tape Specialty, Inc.  
13411 Saticoy St.  
N. Hollywood, Cal. 91605

**Transcriber Co.**  
P.O. Box 478  
Attleboro, Mass. 02703

U

**UREI**  
8460 San Fernando Rd.  
Sun Valley, Cal. 91352

W

**Cecil E. Watts, Ltd.**  
See: Empire Scientific

# the competition.



## TC-920B.

Matching the industry's finest separates in appearance as well as performance.

For unparalleled performance, the TC-920B starts with the heads. Yamaha's unique Pure Plasma Process results in Sendust heads of unparalleled purity, resulting in high permeability of the core for better sensitivity and playback efficiency, excellent S/N ratio, and greatly reduced tape/head wear.

The 920B has a vast array of audiophile features. Like the unique FOCUS switch. In the "SOFT" position, you will attain a more relaxing, mellow quality to the overall listening effect. In the "SHARP" position, you get a more crisply punctuated high frequency sound quality. There's also a fine bias adjust control to match the deck's characteristics to those of the actual tape in use.

A switchable subsonic filter cuts out subsonic interference due to warped records, line hum, etc., and also

safeguards your speakers during playback without altering sound quality. The bar-graph peak level meters have a fast/slow switch to adjust the recovery time of the meters for maximum control over the material you are recording.

The 920B's sleek black cabinetry enhances the high-performance look of this studio quality deck. For maximum convenience an ingenious hinged panel conceals the less often used controls. Everything was done with striking esthetics and total performance in mind.

The TC-720 and the TC-920B will bring the competition to its knees, and it will bring you to your feet, cheering. For the full story, visit your local Yamaha Audio Specialty Dealer listed in the Yellow Pages. Or write us: Yamaha, Audio Division, P.O. Box 6600, Buena Park, CA 90622. From Yamaha, naturally.

 **YAMAHA**

# Ambience and Time-Delay Units

The ADS 10 Acoustic Dimension Synthesizer is a digital time-delay system combining analog and digital technology with built-in amplification and accompanying loudspeakers. The system produces the time delays of the small to large acoustic spaces where live music is heard and extracts "hidden" hall ambience signals from many recordings and broadcasts. Price: \$1,150.00.

The Advent 500 SoundSpace Control is an acoustics simulator which models spaces up to 180 ft. in length through an additional amplifier and pair of speakers. Price: \$599.00.

The Audio Pulse 1000 Digital Time-Delay System also has a dynamic range expander. Six initial delays are from 7 to 95 mS, ambience is continuously variable from 0.0 to 1.2 S, expansion ratio is from 1.0 to 1.5, and rear channel output is said to be completely non-coherent. Frequency response in the delay mode is 20 Hz to 10 kHz,  $\pm 3$  dB. Price: \$950.00.

The Audio Pulse Model Two Digital Time-Delay System has a built-in 25 W/channel integrated amplifier, 3 initial delays from 19 to 103 mS, continuously variable ambience delay from 0.1 to 0.6 S, and Bass, Treble, and Balance controls for the rear channels. Frequency response in the delay mode is 20 Hz to 8 kHz, and the rear-channel output (delayed) is non-coherent. Price: \$585.00.

The Audionics Space & Image Composer uses the Tate Directional Enhancement and Audionics Shadow Vector Systems to reproduce SQ<sup>2</sup> quadraphonic and stereo records and tapes with an ambient and directional quality said to be subjectively indistinguishable from 4-channel master tapes. Its Stereo Enhance mode retrieves ambience and directional information from conventional stereo discs regardless of age. Price: \$795.00.

The Bang & Olufsen Ambio Box offers delay line performance without the necessity of a rear amplifier. Price: \$40.00.

LT Sound's Thompson Analog Delay, Model TAD-4, is designed to provide the type of ambience used by recording studios. It is stated to be capable of delays as long as 240 mS, or as short as under 50 mS. Greater depth and realism of the reverberation effect are produced by delaying the signal sent to the reverberation unit so that it already processes the echo effect. Price: \$550.00.

The LT Sound RV-2 Stereo Reverberation Unit is for line-level inputs only. To attain additional separation in

the mix for a more apparent reverb effect, a Parallel or Cross Mix switch enables the user to cross the reverb produced by the right-channel input over the left-channel output, and vice versa, thereby attaining additional stereo effect. Price: \$305.00.

LT Sound's Reverb Control Center is a monaural device providing preamplification and volume adjustment for 2 low-impedance microphones and an equalization section. It is a three-section, paired-spring unit and has a decay time of 2-2.5 S, without echo capability. Price: \$195.00.

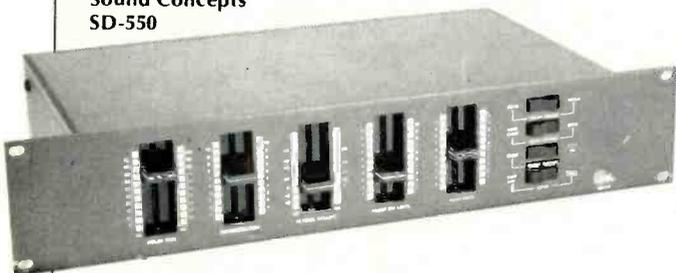
The SAE 4100 Time Delay Ambience System features 3 variable delays that allow it to create literally any kind of desired spatial environment. Price: \$500.00.

The Sansui RA-700 Reverberation Amplifier features continuously adjustable reverb time with visual indication. It can handle 2 tape recorders simultaneously and add echo effects during recording or playback. Reverb time is 1.9-3.2 S (at 1 kHz). Price: \$190.00.

The Sound Concepts SD550 Ambience Restoration System features continuously variable delay time, rear level, high-frequency contour, reverberation level, and front-channel mix level. Its front output is direct or mixed, and no input level-match adjustment is required. Price: \$700.00. Model AD1060 uses similar techniques to reproduce ambient sound over an auto hi-fi system. Price: \$300.00.

68

Sound Concepts  
SD-550



Advent 500



Audionics Space & Image Composer

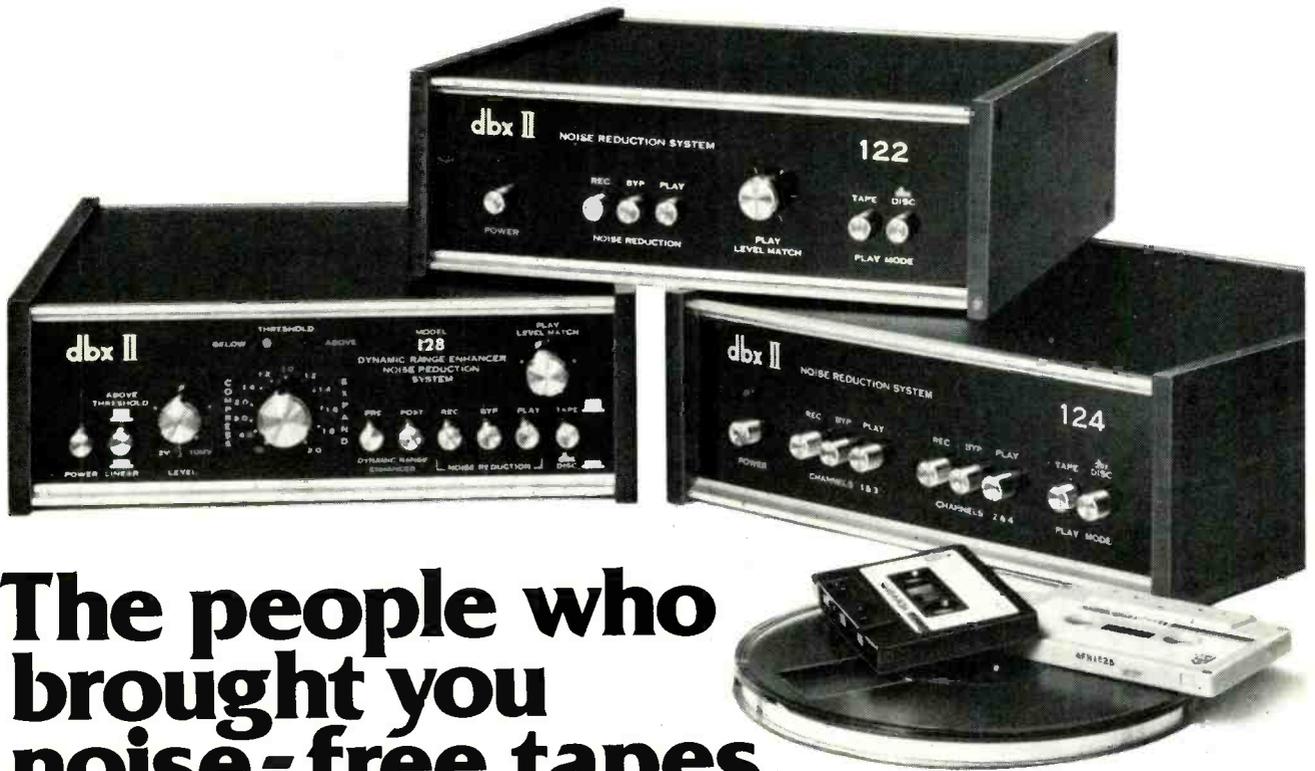


ADS  
10



Audio Pulse  
1000





**The people who brought you noise-free tapes, now bring you noise-free records.**

dbx has a unique noise reduction system that prevents the addition of noise (such as tape hiss) during tape recording. Now this noise reduction technology has been applied to records. You can't make your own, so we make them for you. dbx® Encoded Discs™. Remarkably noise-free records that offer as much as 50% more dynamic range than even digital and direct-to-disc records.

dbx Models 122, 124 and 128 Noise Reduction Systems let you make hiss-free tape recordings that are virtually indistinguishable from the source. The new Model 21 Disc/Tape Decoder lets you enjoy the amazing fidelity of dbx Encoded Discs with any stereo system. Like the dbx encoded tapes that you can make, dbx discs must be decoded by a dbx Type II noise reduction unit. All four dbx models are capable of decoding any dbx disc or tape.

Imagine making your own tape recordings with no audible tape hiss or listening to records with virtually no surface noise.

It's the dbx Models 122, 124 or 128 for enjoying the clarity and dynamic range of dbx encoded tapes. Or, the Model 21 Disc/Tape Decoder for just dbx Encoded Discs. Any way you want to hear it, it's dbx for noise-free music.

dbx Incorporated,  
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Newton, MA 02195  
(617) 964-3210

**dbx**

Making Good Sound Better



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# Noise-Reduction and Filter Systems

The Ace Audio 4000 Subsonic Filter is a sharp cutoff, low-frequency filter to prevent woofers from being driven below their passband by high-powered signals. Price: \$89.50 wired, \$59.25 kit.

The Allison Electronic Subwoofer is an audio bandpass filter and bass equalizer that can extend the response of Allison speaker systems flat to 20 Hz. Price: \$250.00.

The Cerwin-Vega DB-10 Bass Turbo-charger boosts information in the 30 to 45 Hz range by 5 or 10 dB (switchable). The unit also acts as a rumble filter to remove undesirable subsonic noise caused by warped records, turntable rumble, etc. Price: \$90.00.

The dbx Model 122 is a two-channel switchable dbx II tape noise reduction system which will reduce tape noise by 30 dB and improve recording headroom by 10 dB.

The dbx Model 128 incorporates an expander and the dbx II tape noise-reduction system in the same unit which allows tape copies to be made with more dynamics and less noise than the original.

The dbx Model 3BX is a three-band dynamic range expander capable of increasing the dynamics of records, tapes, and radio broadcasts up to 50 per cent, while reducing interference noise.

The LT Sound D-2 Thompson Vocal Eliminator "subtracts" a recording's left channel from its right channel, greatly reducing or eliminating voices while leaving instrumentals intact. The unit has Delay, Level, and Pre-Bass controls and a microphone preamp and mixer circuit. Model TC-1 is similar, but it features a longer delay correction capability more suited for use with slow-speed tape formats such as cassette and eight-track. Prices: Model D-2, \$195.00; Model TC-1, \$495.00.

The LT Sound Model NR-2 provides both a 2:1 compander noise-reduction system and an independent dynamic range-enhancement system capable of 2:1 compression through 1:2 expansion. The sections can be made dual tracking or independent tracking. Price: \$195.00.

The LT Sound Model NR-4 provides 4 channels of noise reduction switchable from the record to the play mode two inputs at a time. Two-channel simultaneous record and tape monitor decode are also possible. Price: \$185.00.

The LT Sound NR-8 offers 8 channels of individually switchable record/play noise reduction. As with the other two units above, this model provides approximately 30 dB of noise reduction over the full frequency range, and a 10 to 15 dB improvement in headroom. Price: \$370.00.

The PSB InfraSonic Barrier is a filter which sharply rolls off frequencies under 20 Hz (-3 dB at 18 Hz). It can eliminate problems caused by warped records, turntable rumble, and tonearm/cartridge resonances. Price: \$109.00.

The SAE 5000 Impulse Noise Reduction System is designed to reduce the clicks and pops present in phonograph records and other program sources. Price: \$225.00.

The Source Engineering Noise Suppressor processes signals in 4 frequency bands. The top 3 are gated to transmit the signal and reject unmasked noise by 14 to 20 dB. Options are steep-cut 7 kHz or 3 kHz filters. Price: \$295.00.

The UREI 501 Sub-Sonic Processor removes subsonic sounds from turntable rumble, warped records, acoustic coupling of turntables to speakers, and wind blast in microphones. The unit has a two-position response switch: In the "Flat" position, response is -3 dB at 30 Hz and down more than 50 dB at 5 Hz, with a roll-off of 18 dB/octave. The "Boost" position adds a 5 dB peak at 40 Hz, down 3 dB at 27 Hz, and more than 40 dB at 5 Hz, also at 18 dB/octave. Price: \$84.00.

SAE 5000



Cerwin-Vega DB-10



UREI 501



# Tomorrow is here early.

Now, a line of audio components which is truly ahead of its time. Introducing the SAE TWO R6 and R9 Receivers, matching T7 Tuner and A7 Integrated Amplifier, and C4 Cassette Deck—a collection of engineering masterpieces meticulously blending unique features with impressive specifications.

SAE TWO Receivers and Tuners have a Quartz-Lock reference of the type used by radio stations in beaming their signal. This system actually locks in the station, eliminates drift, lowers distortion and provides performance limited solely by the station's broadcast quality.

The R9 Receiver features a Digitally Synthesized touch tuning section, first developed for the space program, which precisely advances the tuner to every FCC assigned position with pinpoint accuracy.

Additional features include Digital Readout of the exact station frequency taking the guess work out of finding your favorite stations. And, a massless multi-functional Bar Graph Display which responds instantly

and accurately, providing information on signal strength, multipath and power output.

All SAE TWO Receivers and Integrations feature a Single-Strata Voltage Amplifier which utilizes the hybrid technique of selecting active components from the same production batch and mounting them on a uniform thermal base. The result is superior thermal tracking and gain linearity, unobtainable in conventional designs.

The new C4 Cassette Deck has Metal Tape capability, the latest breakthrough in recording technology. It provides greater high end response with lower distortion. And, with the tape deck's adjustable bias feature you can optimize its performance with any brand of tape available now...or in the future.

Unique features? Yes! Impressive specifications? You Bet!

SAE TWO—see tomorrow's line of components today at your SAE dealer.

**SAE TWO**

For the latest information, fast, write:  
SAE TWO, P.O. Box 60271, Terminal  
Annex, Los Angeles, CA 90060.  
In Canada, The Pringle Group,  
30 Scarsdale Rd., Don Mills,  
Ontario, Canada M3B 2R7.



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# Compressors-Expanders

The Draco Digital Expander processes the audio signal digitally, eliminating distortion and "breathing." THD and IM are said to be less than 0.05 percent, 20 Hz to 20 kHz (at any expansion rate). Price: \$650.00.

The MXR Dynamic Expander is a linear expander with variable expansion (1:1 to 1.6:1). It provides up to 8 dB of upward expansion and 21 dB of downward expansion and has a dynamic range of up to 110 dB. The unit's response time is signal dependent, while release time is user controlled. Price: \$300.00.

The MXR Compunder is said to double the range of most tape decks with compression-expansion ratios of 2:1 and 1:2. There are no critical level adjustments, and continuous monitoring on 3 head decks is afforded by simultaneous compression and expansion. Price: \$149.95.

The RG Pro-20 Dynamic Processor's continuously variable expansion restores up to 20 dB of dynamics to discs, tapes, or broadcasts. Noise reduction is

adjustable, distortion is specified to be less than 0.05 percent, and overall signal-to-noise improvements are up to 20 dB. The RG Pro-16 provides signal-to-noise improvements of up to 16 dB. Prices: RG Pro-20, \$395.00; RG Pro-16, \$299.00. Both models with optional finishes.

The Source Engineering VRE Dynamic Range Expander works on playback to expand dynamic range 8 dB upwards above an adjustable threshold. Alternate expansion dynamics are a combined downwards 8 dB and upwards 6 dB. Price: \$175.00.

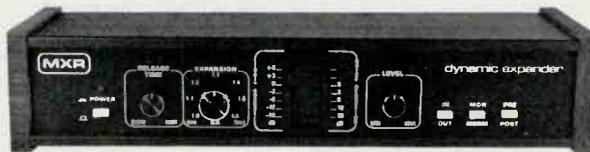


RG Pro-20

Draco Digital Expander



MXR Dynamic Expander



72



EMI. When your recording equipment demands performance standards equal to those used in professional studios. EMI. The tape used by a vast majority of the recording professionals throughout Europe for over 30 years. EMI.

Manufactures over 2 million miles of tape a year. EMI. Available in a full range of premium reel to reel and cassettes.

For information and specifications write to: Empire Scientific Corp., Dept. ET, Garden City, N.Y. 11530.

EMPIRE EMPIRE EMPIRE EMPIRE EMPIRE EMPIRE **EMI EMI EMI** EMPIRE EMPIRE EMPIRE EMPIRE EMPIRE

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# INSIDE EVERY RECEIVER OWNER IS A SPECTRO ACOUSTICS BUYER



What do you do when the old receiver's lost its zip? When your ear's improved, but the sound still hasn't? When you've outgrown the basic bass, treble and occasional mid? What do you do when hifi's lost its high?

Well, if you really want to put the fun back in your system, you'll take a good, hard look and listen at Spectro Acoustics.

Here's a line of high quality stereo components that's built for enjoyment—and priced that way too. Fact is, you can get a complete Spectro Acoustics component system for about the same price as that receiver you were thinking of.

And you'll get a lot more for your money. Such as a dramatic-looking FM stereo tuner—newest addition to the Spectro line—featuring digital readout of station frequency, our exclusive new pinpoint tuning system and astonishing sensitivity.

You'll also have a power amp—we make 4 of them, at two different wattage levels—built to deliver dependable performance with plenty of reserve power. A straight-line preamp featuring adjustable cartridge loading. And a graphic equalizer—choose from 2—that gives you 10 divisions of frequency control per channel, instead of a receiver's 2 or 3.

In short, you'll get more versatility, flexibility and control over your system than any receiver can provide.

You'll also get peace-of-mind with Spectro Acoustics. We build all of our components almost 100% by hand, and subject every one of them to continuous quality control.

We don't hurry through production, so our components don't hurry into the repair shop. That's why Spectro Acoustics owners keep coming back when it's time to add on or trade up. Our careful, limited production means you may have to look a little harder, or wait a little longer for Spectro Acoustics components. But when you do get yours, you can bet they're good ones.

**SPECTRO ACOUSTICS**   
TM  
Built for enjoyment

All Spectro Acoustics components are manufactured in the U.S.A.  
4500 150th Avenue, N.E.  
Redmond, Washington 98052



Enter No. 45 on Reader Service Card

# Record Care Accessories

The Adcom Electronic Static Eliminator is a piezo-electric instrument. Its dual emission chambers permit wider dispersion, and the damped trigger affords consistent effectiveness. Price: \$19.95.

The Adcom Carbon Fiber Record Sweep's conductive fibers sweep accumulated dust from records or film. Moderate reduction of static electricity may be achieved in normal use. Price: \$14.95.

The Ampex Sound Saver Kit contains an anti-static aerosol spray, a manual record duster, a stylus brush, a combination brush/mirror, and instructions for use. Price: \$8.95.

Audio Aids AW-100 releases a calibrated amount of cleaning solution formulated with anti-static, cleaning, and fungicide agents that inhibit mold and bacterial growth. Price: \$3.50.

The Audio Aids AW-200 Record Cleaner is a fabric-covered cylinder with finished edges and wood end-pieces. It may be used dry or with a cleaning solution. Price: \$3.98. Model AW-300 is similar but has a walnut handle. Price: \$6.95.

The Audio Aids AW-400 Stylus Cleaner, set in a walnut handle and with an inspection mirror, will not tangle with the cantilever. Price: \$3.98.

Audio Groome Disco-Film is a gel-like, nontoxic chemical cleaner applied to a record's surface. When dry, the resulting film is peeled off the disc. Each container can handle 35 LPs, or 70 sides, in this manner. Price: \$29.95.

The Audio Groome Stylus Cleaning Fluid (with brush) maintains the stylus of phono cartridges in top condition. Price: \$3.95.

The Audio Groome Static Eliminator is a pistol-shaped device, which produces a static-neutralizing ion stream without the use of batteries or other power, and is used to neutralize static charges found on records. Price: \$39.95.

The Audio Groome Dust Eliminator's carbon-fiber bristles reach into record grooves to remove, trap, and lift off dust and debris. The conductive nature of the carbon fiber acts to neutralize hot spots. Price: \$19.95.

Audio Groome's Dry System Kit contains 3 record-care accessories: the Static Eliminator, Dust Eliminator, and Stylus Cleaner Fluid with brush. Also included are a standard universal headshell, a screwdriver, hardware, and a storage slot for a second headshell. The kit is packaged in a covered mahogany base with a vinyl laminate cover. Price: \$79.95.

Audio Kare's Quietone is an aerosol spray that is said to render a record static-free for the life of the disc. The spray lubricates and preserves a record, and its solvent loosens and dislodges dust particles. Price: \$7.95.

The Decca Record Cleaner is an arm-type, carbon-fiber bristle cleaner with ground wire that removes dust and static electricity from record grooves. Price: \$16.95.

The Decca Zero Ohms Record Brush has 1 million conductive carbon-fiber bristles that enter record grooves to remove dust, grit, and static. A zero-ohm

indicator shows the conductive level of the brush. Price: \$18.95.

The Decca Microbe, a 4-way carbon-fiber device that mounts on the headshell, acts as a record cleaner, static discharger, stylus cleaner, and stylus protector. Price: \$9.95.

Discwasher D3 is a fluid that removes long-term dust not removed with "dry cleaning" while it reduces the static charges found on a record's surface. Prices: \$2.25 for 1 oz., \$9.60 for 6 oz., and \$16.00 for 16 oz.

The Discwasher D-Stat II is a soft turntable mat that reduces electrostatic charges and eliminates bothersome pops of static discharge. Price: \$8.50.

The Discwasher Zerostat is an anti-static piezo-electric pistol for neutralizing static charges on the surface of a disc. Price: \$20.00.

The Discwasher Discorganizer is a milled walnut tray with dustcover that holds record accessories. Price: \$13.50.

Discwasher SC-1 Stylus Cleaner has a brush with nylon bristles mounted at a specific density to remove the waxy deposits from the stylus, with inspection via a magnifying mirror opposite the brush. Price: \$7.00.

The Discwasher System has an angled microfiber brush which picks up, rather than lines up, record dust. The walnut handle stores a bottle of D3 fluid, which will clean fingerprints from records and has buffers for record additives. Price: \$15.00.

Discwasher DiscKit is a milled walnut tray filled with the Discwasher brush, D-3 fluid, SC-1 stylus cleaner, and Zerostat. Price: \$50.00.

## Audio Kare Quietone



Decca  
Zero-Ohms Brush

Audio Groome  
Disco-Film



# 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.

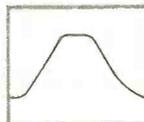
That's because Kenwood High Speed Transistors

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.

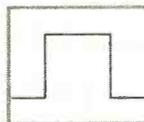
What this means to you is depth and definition that will take your breath away. High frequencies are completely clear and totally non-fatiguing. You'll hear each violin individually in a string section. Each audible harmonic of a single piano note. Even the separate handclaps in recorded applause.

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.



*Pulse waveform response of a conventional amplifier.*



*Pulse waveform response of Hi-Speed amplifier.*

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# Record Care Accessories

Esoteric Audio's Stylus Formula SF<sub>6</sub> is a low-residue fluid that cleans polyvinyl chloride and record polymers from the stylus. It comes with an extension spray tube and a foam cap to catch excess fluid when the stylus is cleaned; this prevents the self-contamination that can occur if a cleaning fluid runs back into the drip bottles after contacting pads and brushes with accumulated dust, grease, and other bacteria. Price: \$6.00.

The Goldring ExStatic Carbon Fibre Sweep Arm is a dry-play, low-drag system that eliminates static and dust during play without liquids. Price: \$27.00.

The Memorex Record Care Kit includes a stylus brush, a bottle of cleaning fluid, and a deep-pile cleaner that removes oil, dust, and dirt from record grooves as it reduces static build-up. Price: \$5.95.

The Radio Shack Hydro-Stor Record Care System produces a vapor that penetrates the velvet-surface cleaner through capillary action. This creates a field of humidity that reduces static charges and allows the contaminants to be removed without wetting the disc. Price: \$9.95.

The Radio Shack Kleentrak Record Cleaner (with brush) removes grime from records as they play. It cleans in advance of the stylus for a noise-free path and may also be used to apply anti-static lube to discs. Price: \$4.99.

Radio Shack's Hydro-Stor Cylinder is a velvet-covered cleaner that protects discs and styli. The cylinder comes with a cleaning fluid. Price: \$4.95.

The Radio Shack Discotron Electronic Static Eliminator neutralizes static charges that attract dust and dirt on record surfaces. Ticks and pops are reduced by aiming the 7-in. unit over the record and squeezing the lever. Price: \$14.95.

The Radio Shack Carbon Fiber Brush has over 1 million fibers that cut static. The brush may be used to clean a record every time it is played without causing damage. Price: \$9.95.

Radio Shack's Professional Stylus Brush removes dust, thereby helping to restore full fidelity. A mirror permits close inspection of the stylus tip, and the brush has a 3/8-in. brushed aluminum cap and handle. Price: \$8.95.

The Radio Shack Disc-Saver Preservative has a mist-spray pump, a buffing mitten, and a fluid-storage cylinder. It eliminates record wear caused by stylus pressure and also retards dust accumulation. Price: \$7.95.

The Reference Monitor Statibrush, a carbon-fiber record cleaner, incorporates a conductive anodized handle which removes static electricity instead of inducing it. Price: \$16.90. The Staticleaner is similar to the Statibrush but sweeps a disc while it is being played. Price: \$39.90.

Sound Saver's The Cylinder, with a 1 1/4-oz. cleaning fluid and a plastic storage tube, uses the humid rather than the "wet" technique. Price: \$6.95.

The Sound Saver Cleaner One is a fluid record cleaner available in 3 sizes: 1 1/2 oz., 4 oz., and 16 oz. Prices: \$2.25, \$6.00, \$16.00.

Sound Saver's Classic 1, which comes with a 2-oz. cleaning fluid, utilizes a humidification cleaning process. The handle is of rosewood grain, and the cleaning surface is plush velvet. Price: \$15.00.

The Watts Parastat is a record-cleaning and static control device. Moisture is used to control static charges, while 2 plush pads lift and remove dust and debris from record grooves so that no wet residue remains. Price: \$18.95.

The Watts Dust Bug is a toner-like device that uses a brush of shaped nylon bristles to dislodge dust and debris from the record's surface and a plush mohair pad to trap the dirt and control static charges. The device may be used with old and new records. Price: \$8.95.

The Watts Parostatik Preener is a cylinder of plush nylon used to control static and lift dirt and debris from record grooves. Moisture inside the "preener" is used to control static charges. Price: \$6.95.

The Watts Hi-Fi Parastat, sold with stylus cleaner, is designed to maintain new records in like-new condition. Price: \$19.95.

The Watts Stylus Cleaner is a pad of formed-nylon plush that removes accumulated dust and vinyl from styli. It may be used with all stylus types. Price: \$2.95.

The Watts Humid Mop Kit keeps record-care equipment in top condition and can be used to maintain most record cleaners. Price: \$5.95.

The Watts Anti-Static Fluid prevents static build-up on records without leaving a harmful residue to reduce record fidelity. Price: \$2.95.

The Watts X-Static generates a uniform field of charged particles to neutralize the static charges found on records. It does not require the use of batteries or other outside power. Price: \$29.95.

The Watts Wash Brush is composed of nylon bristles specially honed to fit record grooves. The brush is designed to properly dislodge dust and debris from record grooves when used with a mild detergent. Price: \$5.95.



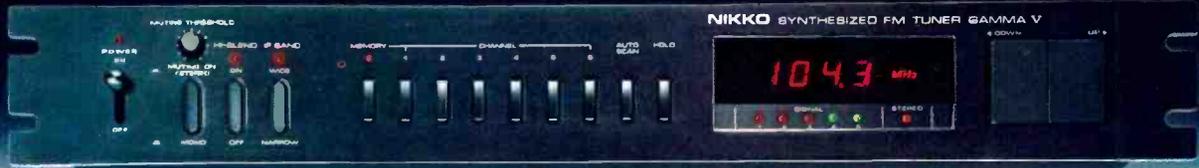
Radio Shack  
Discotron

Sound  
Saver  
Classic 1



Esoteric Audio SF<sub>6</sub>

# THERE ARE FASTER WAYS TO BUILD SEPARATES, BUT THEY WOULDN'T HAVE NIKKO'S ONE-OF-A-KIND EXCELLENCE.



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That's why we go one step beyond the inspection and quality control procedures of most manufacturers. Nikko's "200% Quality Control" program takes more time. But we know that once you buy a Nikko preamp, amp or tuner you're going to enjoy it for a long time. And you can be confident you will because we continuously monitor every unit as it moves along each station of our production line. Then we thoroughly inspect each and every unit a second time before it's shipped to your Nikko dealer. It's Nikko's way to make sure you always get the accuracy, dependability and outstanding performance that we build in. And that's what you get with these new separates.

## Alpha III MOS-FET DC Power Amplifier

The Alpha III uses two separate power supplies, each with its own transformer. Its direct-coupled DC amplifier lets nothing come between you and the music since there are no input or output capacitors in the circuit. By combining this design with two pairs of DC power



MOS-FETs, there's rock-solid stability. The Alpha III delivers 80 watts per channel, minimum RMS, at 8 ohms, from 20 to 20,000 Hz, with no more than 0.008% total harmonic distortion. And you can monitor power output with fast, accurate multi-LED indicators.

## Beta III Stereo Preamplifier

From its direct-coupled phono input to its high-speed circuitry and top performance specifications, the slim-line Beta III is the perfect control center. Complete versatility is provided to accommodate the impedance characteristics of different phono cartridges. There's also the convenience of two-way tape dubbing and switch-selectable low and subsonic filters. The combination of high sensitivity, flat frequency response and wide dynamic range coupled with low noise and distortion makes the Beta III a professional performer you can enjoy at home.



## Gamma V Synthesized FM Stereo Digital Tuner

FM stations a hairline away from each other pose no challenge for the Gamma V

Whether you tune manually or automatically, its digital synthesized tuning circuit pinpoints and locks in the signal. You can even program the unit to memorize and store up to six stations automatically by the push of a button. LED indicators show signal strength and stereo operation. With switching for high blend, IF band (wide or narrow), stereo/mono and adjustable muting, plus exceptional specifications, the Gamma V is everything you'd ever want in an FM tuner.



So if you want to get the best sound from records, tapes and FM broadcasts, you want Nikko separates. We build them as though they're one of a kind, because we refuse to compromise a standard of excellence abandoned by many for the sake of expediency.

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- Frequency Servo Control
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## THE LINEAR DRIVE QUARTZ LOCK MT6335 IS THE KIND OF TURNTABLE YOU'D EXPECT FROM THE NEW FISHER.

Fisher's technological leadership in high fidelity was never more elegantly stated than in the new MT6335 Linear Drive quartz lock turntable. Just as direct drive surpassed belt-driven turntables in terms of performance and reliability, so has Linear Drive from the new Fisher brought turntable performance into a new state-of-the-art.

**SIMPLER IS BETTER.** Nothing could be simpler or quieter than Linear Drive. The only moving part is the platter itself. There are no complicated motors or rotating electronic components—just a totally silent, dependable drive system with virtually nothing to go wrong, even after thousands of playings. (The MT6335 comes with an unheard-of five-year warranty.) Proof of the incredible stability and performance is seen in the specs: 0.035% wow and flutter. Rumble is an inaudible -70 dB (DIN B).

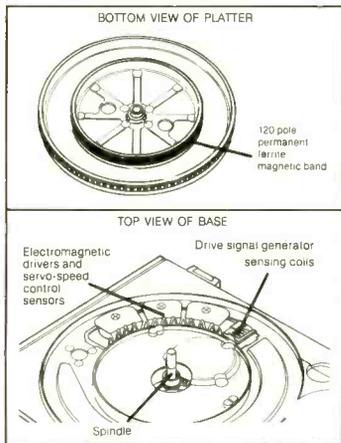
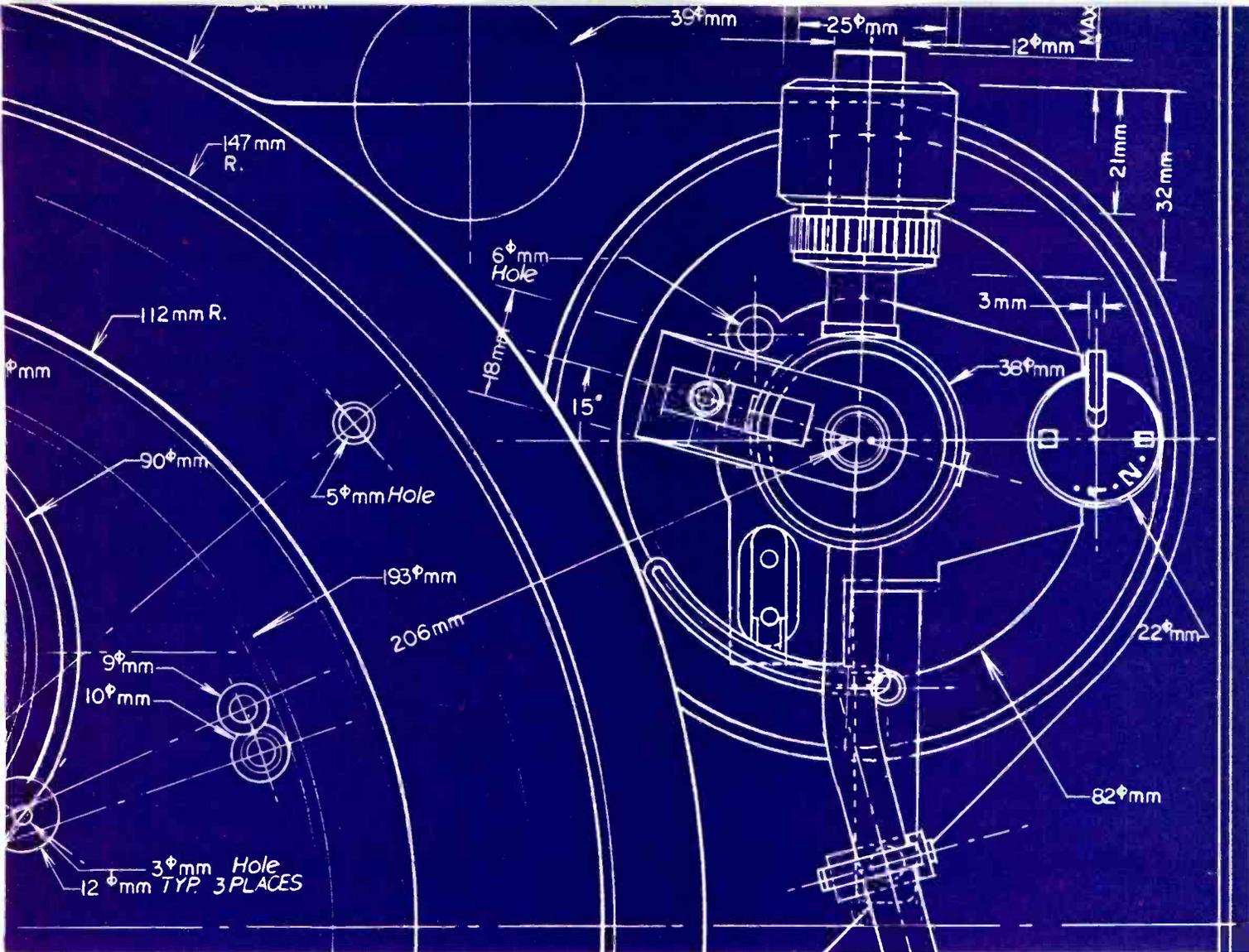
**QUARTZ LOCK ACCURACY.** Total speed accuracy is assured by

the most effective method in use today—a quartz lock phase locked loop servo circuit. Platter speed is continuously monitored and compared to a quartz reference signal for instantaneous speed correction. Deviation from 33 $\frac{1}{3}$  or 45 rpm is virtually zero.

### STROBE & SPEED CONTROL.

Other features combine to make the MT6335 a top-performing, easy-to-operate high fidelity turntable. There's a strobe light and fine speed control to alter record pitch and confirm speed accuracy, viscous damped cueing, automatic tonearm return and shut-off—and all controls are front-panel mounted where you can operate them with the dustcover closed. A carefully crafted, fully counterbalanced S-shaped tonearm accommodates most any cartridge and built into the handsome base is a stylus overhang gauge.

**LINEAR DRIVE—THE HEART OF THE MT6335 TURNTABLE.** The



vide constant, smooth platter rotation. Conventional 12 or 16 pole direct drive systems can't compare to the MT6335 in terms of low wow and flutter, and freedom from "cogging." The utter simplicity of Fisher Linear Drive means years of trouble-free performance.

**IT'S WHAT YOU'D EXPECT FROM THE NEW FISHER.** We invented high fidelity over 40 years ago. We've never stopped moving forward. The MT6335 is a good example of that technological leadership. Part of the new Fisher. Where the only thing about us that's old is our tradition for quality and craftsmanship. See the MT6335 at your Fisher dealer. All these features and an under \$250 price.

platter on the MT6335 is the only moving part of the turntable drive system. Encircling the platter is a 120-pole magnetic strip. Three drive coils beneath the platter act upon this magnetic strip to propel the platter. Magnetic pulses from the coils "overlap" one another to pro-

New guide for buying high fidelity equipment. Send \$2.00 with name and address for Fisher Handbook to: Fisher Corporation, Department H, 21314 Lassen Street, Chatsworth, California 91311.

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**SPECIFICATIONS:**

Motor	120 Pole Linear Drive Quartz	Tracking Force Range	0.6 — 3.5 grams
	Phase Locked Loop	Maximum Tracking Error	± 1.5%
Drive System	Direct	Anti Skate Control	
Wow and Flutter (WRMS)	0.035%	Calibrated Adjustable	
Rumble (DIN 45539B)	-70 dB	Viscous Damped	
Speed Variation	0% (Quartz Lock On)	Weight	18 lbs.
Speed Control Range	± 6% (Quartz Lock Off)	Dimensions (WxDxH)	17½" x 14½" x 6"

the New  **FISHER**  
The first name in high fidelity.®

# Equipment profiles

## Pioneer TX-9800 AM/FM Stereo Tuner



### Manufacturer's Specifications

#### FM Section

**Mono Usable Sensitivity:** 8.8 dBf (1.5  $\mu$ V).

**50-dB Quieting Sensitivity:** Mono, 13.2 dBf (2.5  $\mu$ V); stereo, 36.1 dBf (35  $\mu$ V).

**S/N at 85 dBf:** Mono, 83 dB; stereo, 80 dB.

**THD:** Mono, 0.04 percent at 1 kHz, 0.05 percent at 100 Hz, 0.06 percent at 6 kHz, wide; stereo, 0.07 percent at 1 kHz, 0.1 percent at 100 Hz, 0.2 percent at 10 kHz, wide.

**Capture Ratio:** 0.8 dB, wide; 2.0 dB, narrow.

**Selectivity:** 30 dB, wide; 85 dB, narrow.

**Frequency Response:** 20 Hz to 15 kHz, +0.2, -0.5 dB.

**I.F. and Spurious Rejection:** 110 dB.

**Image Rejection:** 120 dB.

**AM Suppression:** 65 dB.

**Subcarrier Rejection:** 70 dB.

**Muting Threshold:** 19.2 dBf (5.0  $\mu$ V).

**Stereo Separation:** 55 dB at 1 kHz, 40 dB from 20 Hz to 10 kHz.

#### AM Section

**IHF Sensitivity, External Antenna:** 15  $\mu$ V.

**Selectivity:** 20 dB, wide; 50 dB, narrow.

**S/N:** 55 dB.

**Image Rejection:** 70 dB.

**I.F. Rejection:** 65 dB.

#### Audio Section

**Output Level, FM:** 650 mV fixed, 50 mV to 1.3 V variable.

**Output Level, AM, 30 Percent Modulation:** 200 mV fixed, 15 mV to 400 mV variable.

#### General Specifications

**Power Requirements:** 120V, 60Hz, 28W.

**Dimensions:** 17 $\frac{3}{4}$  in. (453 mm) W. x 6 $\frac{1}{8}$  in. (155 mm) H. x 15 $\frac{3}{8}$  in. (390 mm) D.

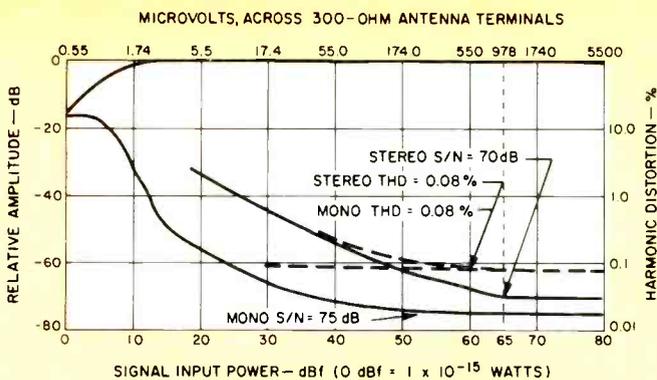
**Weight:** 20.5 lbs. (9.3 kg).

**Price:** \$450.00.

Pioneer has come up with another carefully engineered AM/FM tuner which should appeal to those FM listeners who are less concerned with such things as frequency synthesis and digital frequency readout than they are with good sensitivity, low distortion, and basic drift-free operation. An added bonus is the surprisingly good AM reception which can be obtained from the unit under certain conditions which we will discuss later.

The front panel of the TX-9800 resembles that of other Pioneer components, in that it features a large, highly visible, brushed-gold, sloped dial area, the lower section of which is

linearly calibrated for FM frequencies and has the usual slightly compressed frequency scale for AM tuning. Above the frequency notations are a pair of tuning meters at the left (signal strength and center of channel), FM and AM indicator lights at the right, and three more indicator lights in between. These last three lights denote stereo reception, precise center channel tuning, and the tuning-lock feature. With the function switch set to FM and the FM Muting/Mode switch set to On, this last indicator light comes on when you take your hand off the tuning knob at the optimum tuning point. Its illumination indicates that the built-in quartz-reference lock-

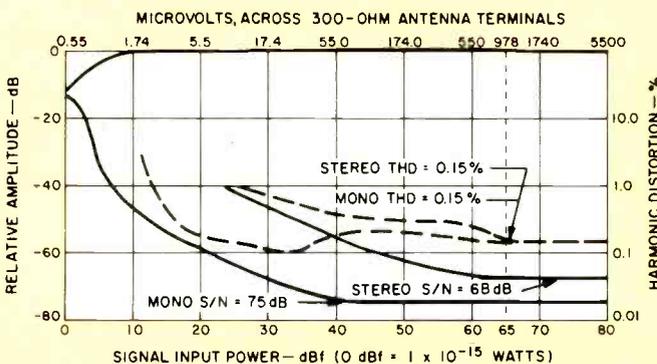


**Fig. 1 — Mono and stereo quieting and distortion characteristics for the Wide i.f. setting of the FM section.**

ing circuit has been activated by the touch-sensor detector circuit associated with the tuning knob and that the frequency of the local oscillator is locked to track the frequency of the signal to which you have tuned. Four small sliders called "memory markers" can be positioned below the frequency scales as a reminder of the frequency of most-tuned-to-stations.

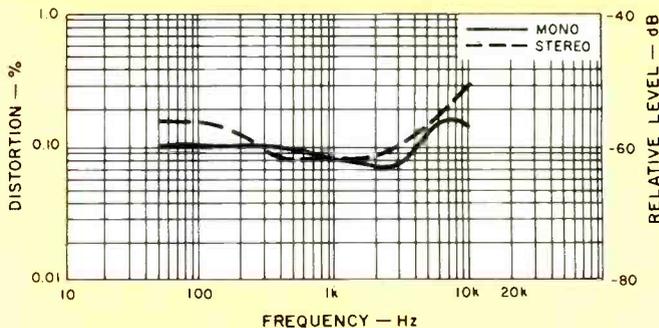
Along the lower section of the front panel are a power on/off toggle switch; a rotary *Output Level* control; a large, flywheel-coupled tuning knob; AM-FM function selector switch; a *Narrow/Wide* i.f. toggle switch, an MPX-blend or noise-filter switch, and the FM *Muting/Mode* switch previously referred to. Pioneer has taken the route of permitting the muting feature to be turned off only when mono FM is selected. While we have objected to this approach in the past (preferring the ability to tune to very weak stereo FM stations if we so choose), it turned out during our measurements that Pioneer has set the muting threshold at a sufficiently low level, just below the stereo switching threshold, so that the muting switch arrangement poses no problems under any practical listening conditions.

The rear panel of the TX-9800 contains the usual array of antenna terminals, for 75- or 300-ohm FM transmission lines, external AM antenna lead connection, and "ground." Just below these terminals are an FM de-emphasis switch (with settings for standard 75-microsecond or 25-microsecond de-emphasis), and a switch which alters the sensitivity of the



**Fig. 2 — As above for the Narrow i.f. setting.**

touch-sensor feature on the tuning knob. Fixed and variable pairs of output jacks are centrally located next to a pair of "multipath" output jacks which may be connected to the vertical and horizontal inputs of any oscilloscope for observation of multipath effects during antenna orientation. A two-way, pivoting ferrite-bar AM antenna rests high on the rear panel when it is tucked up against the chassis, but can be pivoted downward and rotated for best AM reception. A single a.c. convenience outlet is located at the lower right of the rear panel and is not controlled by the power on/off switch.



**Fig. 3 — Distortion vs. frequency for the Wide i.f. setting.**

### Circuit Highlights

A two-stage r.f. amplifier is used in the FM front end of the TX-9800, along with a five-section tuning capacitor. Three dual-gate MOS-FETs are used in the r.f. stages. An automatic phase-control circuit is employed to safeguard against possible local oscillator drift which might be caused by fluctuations in temperature or humidity. The output of a self-contained quartz-crystal oscillator is divided-down to 100 kHz and used as a reference signal for "locking" the local oscillator to the desired tuned-to frequency difference of 10.7 MHz.

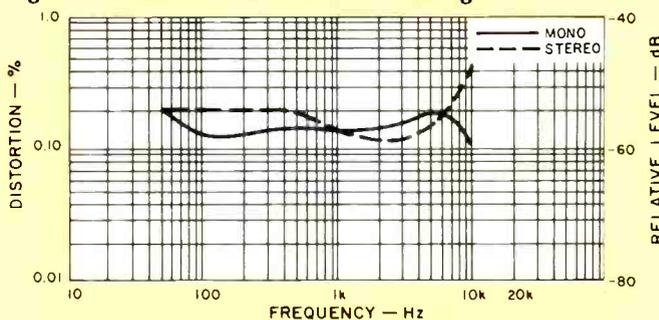
The FM and AM i.f. sections can be operated in either a wide-band or narrow-band mode. A dual-element, linear-phase ceramic filter is used in the FM wide-band mode, while a 10-element, linear-phase ceramic filter is used in the narrow-band FM mode.

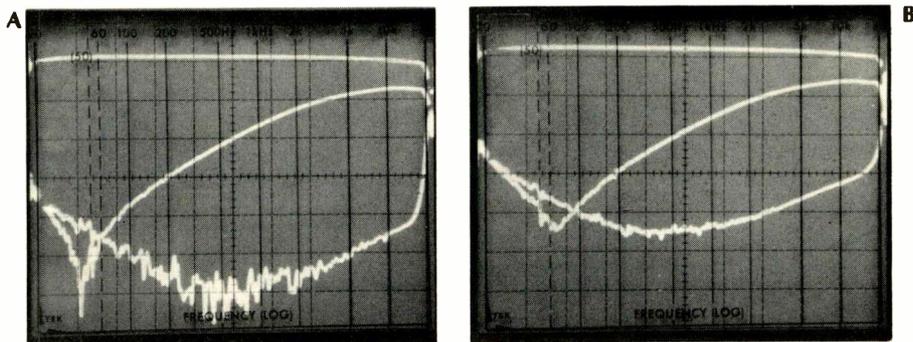
The same type of approach is used in the AM i.f. section. A 3-pole, 7-element, LC bandpass filter is used in the AM wide-band mode, while a narrow-band ceramic filter added to the first filter is employed in the narrow mode. The AM front end uses a 3-gang, variable-capacitor-tuned type of r.f. amplifier circuit and a sensitive, low-distortion IC. AGC voltage is supplied to each section of the AM circuitry.

### FM Performance Measurements

Several tuners and receivers which we have recently tested have employed dual-bandwidth i.f. sections but exhibited little, if any, difference in performance when switched from one mode to the other, except for moderate changes in selectivity. Such is not the case with the TX-9800. Each mode has its definite uses and performance differences are significant, so that all of our measurements had to be made for both i.f. bandwidth settings. Figure 1 is a plot of mono and stereo quieting and distortion characteristics for a 1-kHz modulating signal (100 percent modulation) when the tuner is operated in the *Wide* mode. Under these conditions, usable sensitivity measured  $1.7 \mu\text{V}$  (9.8 dBf), while the 50-dB quieting point was reached with a signal strength of  $2.8 \mu\text{V}$  (14.1 dBf) in mono and  $35 \mu\text{V}$  (36.1 dBf) in stereo. Signal-to-noise ratio in this mode measured 75 dB in mono and 70 dB in stereo,

**Fig. 4 — As above for the Narrow i.f. setting.**





**Fig. 5 — Frequency response and separation in, a, Wide and, b, Narrow i.f. settings. Middle trace in both is with MPX Noise Filters switched in.**

while THD was 0.08 percent for both mono and stereo. Repeating the same measurements in the *Narrow* setting, usable sensitivity in mono remained the same, but 50-dB quieting improved to a very low  $2.0 \mu\text{V}$  (11.2 dBf) in mono and  $27 \mu\text{V}$  (33.8 dBf) in stereo, both figures being far better than published claims (which may refer only to the *Wide* mode). Mono S/N remained the same, at 75 dB, while in stereo the S/N was fractionally lower at 68 dB. These results are plotted in Fig. 2, as are the 1-kHz distortion characteristics, which measured 0.15 percent for both mono and stereo.

Proof that the wide/narrow options were doing what they were supposed to do was even further evidenced by our capture-ratio and alternate-channel-selectivity readings. These turned out to be 32 dB in the *Wide* mode and 85 dB in *Narrow* for selectivity, and 1.0 dB and 2.0 dB for capture ratio in the *Wide* and *Narrow* modes, respectively. The i.f., image, and spurious response rejections were all in excess of 100 dB, the maximum figure which we are able to read in our laboratory. AM suppression was also excellent, with a reading of 65 dB exactly as claimed.

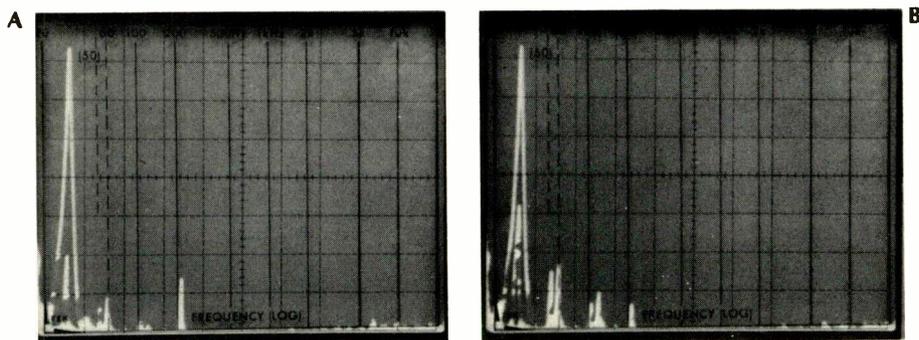
Figure 3 is a plot of distortion versus frequency, in mono and stereo, for the wide-band mode, while in Fig. 4 we have plotted the same performance characteristics for the narrow-band mode. In wide-band use, THD read 0.1 percent at 100 Hz and 0.18 percent at 6 kHz in mono and 0.16 percent at 100 Hz and 0.18 percent at 6 kHz in stereo. Switching to the narrow-band i.f. mode, THD increased to 0.13 percent at 100 Hz and 0.2 percent at 6 kHz in mono and to 0.2 percent at 100 Hz and 0.18 percent at 6 kHz in stereo. These results are what we would expect in a dual-bandwidth FM circuit of this sort.

Muting threshold and stereo-switching threshold were  $5.0 \mu\text{V}$  (19.2 dBf) in the *Wide* mode, and changed slightly to

$7.0 \mu\text{V}$  (22.1 dBf) when the *Narrow* i.f. mode was used. These threshold levels are ideal in terms of the quieting characteristics and other performance levels of this tuner.

Frequency response was virtually flat from 30 Hz to above 15 kHz, as indicated in Fig. 5 (a and b), upper trace. In these plots, vertical sensitivity is 10 dB per division and the sweep is logarithmic from 20 Hz to 20 kHz. The lower traces in Fig. 5 represent separation, while the middle traces show what happens to separation when the MPX or blend switch is activated. Without the MPX-filter switch On, we measured separation of 55 dB at 1 kHz, 49 dB at 100 Hz, and 38 dB at 10 kHz in the *Wide* mode. Separation decreased to 51 dB at 1 kHz, 40 dB at 100 Hz, and 32 dB at 10 kHz when we switched to the *Narrow* mode.

The purity of what crosstalk there was in the unmodulated channel when operating in stereo and in the *Wide* mode is clearly evident from Fig. 6 (a). In Fig. 6 (a and b) sweep is now *linear* from 0 Hz to 50 kHz, at 5 kHz per horizontal division. The large "spike" at left of each display represents the reference (desired) 5-kHz modulating signal seen at the left-channel output. The lower spike contained within the taller reference spike is the actual 5-kHz crosstalk in the right output channel. Note that it is exactly 54 dB below the reference (each vertical division represents 10 dB). In addition, we see some distortion components to the right, as well as a 19-kHz pilot "blip" some 60 dB below the reference. When the same plot was repeated in the *Narrow* i.f. mode, separation decreased to some 41 dB (spike contained within taller reference spike) as might be expected for a 5-kHz modulating signal, but in addition, new and larger distortion components were generated at 10 kHz and 15 kHz which were not seen, or were of much smaller amplitude when the *Wide* mode (Fig. 6a) was employed. These photos clearly illustrate the



**Fig. 6 — Spectrum analysis of crosstalk from 5-kHz modulation applied to the left channel in, a, Wide and, b, Narrow i.f. modes.**

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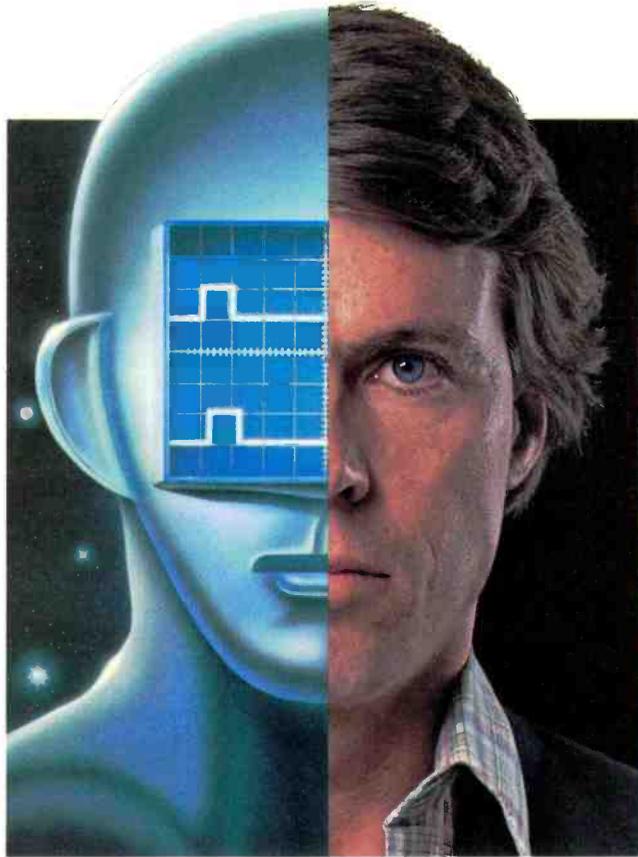
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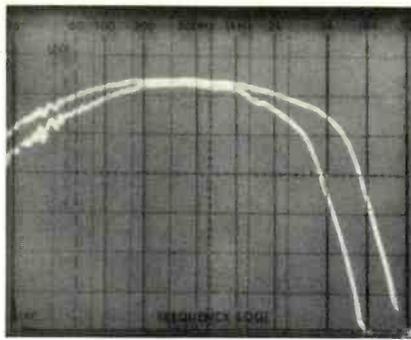
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**Fig. 7 — AM tuner frequency response in *Wide* and *Narrow* i.f. modes.**



advantage of having a *Wide* mode in a good FM tuner, as well as the trade-offs that take place when narrow-band i.f. must be employed.

### Dual-Bandwidth AM Tests

One has but to examine the two frequency response plots of the AM tuner section shown in Fig. 7 to appreciate the fact that Pioneer's unusual incorporation of dual-bandwidth selection in the AM tuner section of the TX-9800 was not an idle embellishment. The curve, which drops off more rapidly at the low and high frequency ends of the audible spectrum, is typical of the response of most AM tuner sections found in high-fidelity receivers and tuners. The -6 dB roll-off point is at approximately 2.5 kHz. Switching to the wide-band position, response extended to beyond 5 kHz for the same -6 dB

roll-off point — and in audible listening tests, the difference is striking. Of course, if you are in a crowded signal area or listen to AM late in the evening, you may well find that you have to give up the better response in favor of improved selectivity, but at least the options are provided in this well-designed tuner.

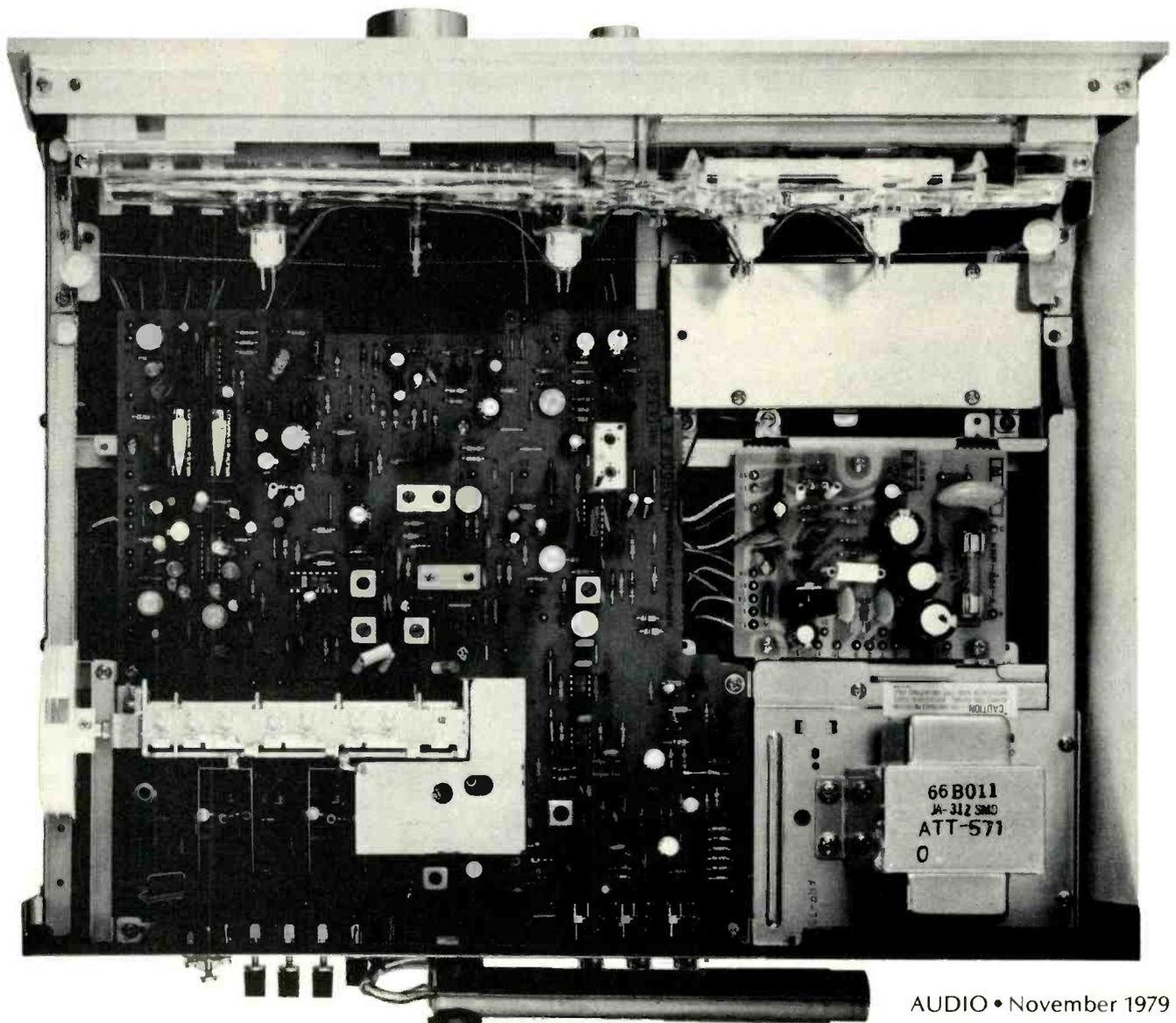
### Listening and Use Tests

In tuning to relatively weak signals, we were impressed by the excellent quieting slope of the FM tuner section. Under these listening conditions, the *Narrow* setting is definitely preferred, since its quieting slope is even greater or faster than that of the *Wide* mode. With a good strong signal received, however, switching to the *Wide* mode causes distinct and audible improvement in sound quality, as it should. The "edginess" often associated with lesser FM designs is completely absent, indicating a minimum of IM distortion. This is especially important when listening to the few live-on-tape concerts which are often broadcast or simulcast in our listening area.

In summary, the Pioneer TX-9800 exemplifies all that is good and legitimate in a carefully engineered and built stereo FM/AM tuner. The glamor, in this case, is on the inside, in the circuitry, rather than on the front panel and, to this serious FM enthusiast (and, I suspect to a great many others as well), that's where it really counts!

*Leonard Feldman*

Enter No. 90 on Reader Service Card



AD-6700

AD-L40

AD-6900MK II

# Put metal tape where it will do the most good.

Again AIWA leads the way toward the ultimate in cassette technology—with three of the most sophisticated metal-capacity decks you can buy: the AIWA AD-6900MK II, AD-6700 and AD-L40.

Performance is simply unparalleled.

At -20 dB recording, AIWA's state-of-the-art AD-6900MK II boasts a frequency response of 20~20,000 Hz with metal tape. Even at 0 dB, frequency response is an exceptionally broad 25~12,500 Hz  $\pm 3$  dB.

This superb performance is maximized by AIWA's extremely durable Ferrite Combination V-Cut (CVC) playback/record head. With the best possible gap widths of 5 microns for recording and 1 micron for playback.

The AD-6900MK II's unique 3-head design not only lets you compare source with tape during recording—it also permits the most precise bias adjustment available today for FeCr, CrO<sub>2</sub> and all other LH/Normal tapes: AIWA's exclusive FLAT RESPONSE TUNING SYSTEM.

And only AIWA's AD-6900MK II and AD-6700 offer advanced feather-touch logic controls including Cue & Review—plus exclusive full-function wireless remote con-

trol from across the room. Both decks also feature AIWA's exclusive Double Needle Meters for simultaneous monitoring of Peak and VU.

AIWA's newest AD-6700 and AD-L40 are just as sophisticated.

The AD-6700 offers 2-head design, convenient Auto/Repeat with Memory Switch, full-function wireless remote control and an amazingly accurate 9-point LED peak power display in three dramatic colors.

AIWA's ultra-modern AD-L40 offers the only 20-point LED horizontal peak power bar graph you can buy—for instant three-color warning of distortion.

All three decks were designed with a special Ferrite double-gap erase head and high-power erase circuitry.

So if you're ready for metal tape, put it where it will do the most good. Inside AIWA's incredibly advanced AD-6900MK II, AD-6700 or AD-L40.



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35 Oxford Drive, Moonachie, New Jersey 07074.  
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Enter No. 5 on Reader Service Card

# There is only one real pioneer It's Sony.



**1957:**  
The world's first pocket transistor radio.

In 1954, a fledgling Japanese tape recorder manufacturer visited America to investigate a new device called the transistor.

company that virtually founded the era of transistorized high fidelity—is still at its very forefront.

At first, things were less than encouraging. “Transistors are only good for hearing aids,” they were told. “And besides, they can’t be mass produced.”

Undeterred, the Japanese representatives returned to Tokyo.

Thirty-six months later, the world saw its first pocket transistor radio.

Followed by the world's first all-transistor FM radio.

And, partially as a sign of their continuing dedication to audio, the Tokyo Telecommunications Engineering Corporation adapted the Latin word for sound—“sonus”—and changed its name to Sony.

In the years that have followed, Sony has never faltered in its dedication to technological innovation. And we'd be loathe to estimate how often our advances have ended up on the circuit boards and front panels of our competitors' equipment as “technological breakthroughs.”

But enough of the past. The hi-fi components featured here stand as eloquent proof that Sony—the

## The V5 receiver:

To this day, only Sony offers Sony quality.

Unlike hi-fi receivers designed to impress you with a facade of magic buttons and switches, Sony receivers are designed to impress you with rich sound.

Case in point: the V5.

In technical terms, the V5 delivers 85 watts per channel at 8 ohms from 20 to 20,000 hertz with no more than 0.07% total harmonic distortion.

In human terms, this means the receiver can reproduce every note of music any instrument can play with no audible distortion. And it can power two sets of speakers without straining.

But that's only the beginning.

Instead of using the mundane power transformers found in competitors' products, the V5 utilizes more expensive toroidal core transformers that provide richer bass.

## A few Sony Audio firsts:

- 1949:** Obtained patent on the basic magnetic tape-recording system.
- 1952:** Developed stereo broadcasting in Japan.
- 1954:** Introduced condenser microphone.
- 1955:** First consumer stereo tape recorder in Japan.
- 1959:** Invented “Tunnel Diode”; basis of all high-speed, low-distortion semiconductor.
- 1965:** First all-silicon solid state amplifier.
- 1966:** The first servo-controlled turntable. Forerunner of quartz-locked turntables.
- 1968:** First electronic end of record sensor.
- 1969:** First digital-synthesized FM tuner.
- 1969:** Invented the ferrite tape head.
- 1973:** Invented the V-FET: Opened era of high-speed transistors.
- 1973:** First to manufacture ferrichrome tape.
- 1973:** Dr. Esaki wins Nobel Prize in Physics for “Tunnel Diode.”
- 1975:** First turntable with carbon-fiber tone arm.
- 1977:** The world's first consumer digital audio processor.
- 1977:** First consumer amplifier with pulse power supply.
- 1978:** Patented liquid crystal recording meters.



**1954:**  
The first Japanese transistor.



**1950:** Japan's first tape recorder, the “Type G.”



**1979:** The V5 receiver: Designed for people who appreciate value as much as they appreciate sound.

# in high fidelity.



**1979:** The new TA-F40 integrated amplifier and ST-J60 digital synthesized FM tuner. Separate components that sound as sophisticated as they look.

Instead of cutting corners by using a flimsy pressboard bottom, we've cut interference by encasing the *entire* receiver in metal.

And for better FM reception, instead of using the standard three- or four-gang variable-tuning capacitor, we've opted for a higher quality five-gang model.

All of which explains why if you pay a few dollars less for one of our competitors' receivers, it's probably because you're getting less receiver.

## The new Sony cassette decks: The state of the art, from the people who invented it.

Since we introduced tape recording to Japan in 1950, Sony has sold millions of tape decks.

A quick look at our new TC-K65 cassette deck will explain why.

Like all two-motor cassette decks, the TC-K65 is designed for low wow and flutter. Unlike others, however, we feature "brushless and slotless" motors that reduce this problem to the point of being inaudible.

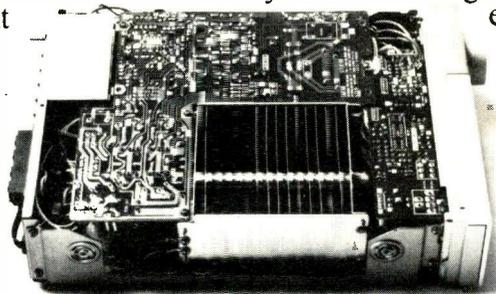
Instead of using just any tape head material, the TC-K65 features Sony "Sendust and Ferrite" heads that combine wide response with extreme durability.

Instead of using an ordinary metering system, we've developed a 16-segment LED meter whose life expectancy far exceeds the fancy blue fluorescent models other companies are currently touting.

And there's also a "Random Music Sensor" for preprogramming tapes, settings for metal



**1979:** The new TC-K65. Sony remains one of the only hi-fi companies to produce our own tape transports, motors, meters, heads—even the tape itself.



**1979:** The Sony "ThermoDynamic Cooling System." Until now, only available in satellites.

tape, remote control and timer capabilities, and the kind of high-quality D.C. tape head amplifier you'll find in almost no one else's tape decks.

## But you really haven't heard anything yet.

Unfortunately, we don't have enough space here to tell you the complete Sony hi-fi story.

Like the way a recent dealer survey rated our turntables #1 in value and performance.

Or the way our new separate tuners and amplifiers (not to mention micro components) utilize highly advanced light-weight pulse power supplies

whose levels of distortion are virtually unmeasurable.

Or how they use a NASA developed "ThermoDynamic Cooling System" that eliminates heat, excess wire and the distortion and interference that normally accompany them.

If you'd like to hear more about the complete line of Sony hi-fi components (or if you need the name of your nearest dealer) write to Sony, P.O. Box CN 04050, Trenton, New Jersey 08650.

In the meantime, if somebody makes noise about innovations in high fidelity, think of the biggest pioneer in audio. And remember Sony.

## SONY AUDIO

We've never put our name on anything that wasn't the best.

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# Acoustic Research Model AR90 Loudspeaker System

## Manufacturer's Specifications

**Type:** Floor-standing, full-range system.

**Drive Units:** Two 10-in. (250-mm) acoustic-suspension woofers; one 8-in. (200-mm) lower midrange cone; one 1½-in. (38-mm) upper midrange hemispherical dome, and one ¾-in. (19-mm) hemispherical dome tweeter.

**Crossover Frequencies:** 200 Hz, 1200 Hz, and 7000 Hz.

**Impedance:** 4 ohms nominal, 3.2 ohms minimum.

**Controls:** Three 3-position switches for lower midrange, upper midrange, and high range level control.

**Efficiency:** One watt will produce 87 dB SPL at one meter on axis.

**Recommended Amplifier Power:** 50 watts minimum per channel.

**Dimensions:** 14½ in. (368 mm) W x 15¼ in. (386 mm) D x 43¾ in. (1102 mm) H.

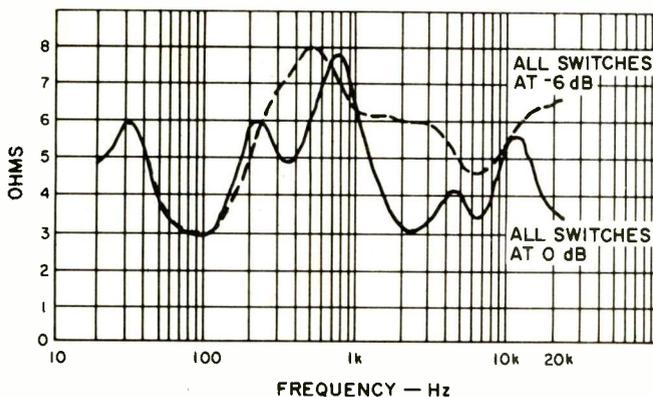
**Weight:** 82 lbs. (37 kg).

**Price:** \$550.00 each.



The Acoustic Research AR90 is a full-range, floor-standing loudspeaker system. Assembled in a vertical configuration, the AR90 stands 1.1 meters tall (43 inches) and weighs a hefty 37 kg (82 lb.). The top and sides are finished in walnut veneer with the front and lower sides covered with black cloth grilles. This system is slightly smaller and much less expensive than Acoustic Research's top-of-the-line AR9, but it clearly embodies the same design philosophy.

**Fig. 1 — Magnitude of impedance for the two extreme equalizer settings.**



The AR90 is a four-way loudspeaker system. A 19-mm (¾-in.) dome tweeter covers the frequency range above 7 kHz, a 38-mm (1½-in.) upper-midrange dome driver handles 1200 to 7000 Hz, while a 200-mm (8-in.) driver handles 200 Hz to 1200 Hz, and two 250-mm (10-in.) woofers are mounted on the lower sides of the enclosure and cover frequencies below 200 Hz. These woofers face the sides of the enclosure and are intended to use the wall against which the loudspeaker is placed for augmenting bass without incurring cancellation effects.

Connection to the speaker is made to binding posts placed in a recessed cavity on the rear of the enclosure. Three 3-position switches are also mounted in this cavity and allow the user to adjust the level of the lower midrange, upper midrange, and tweeter by 3-dB steps.

An extremely well-written reference manual is supplied with these speakers, and even the least technical user should be able to set up the AR90 with no difficulty whatsoever. For the more technically minded, the manual explains how to troubleshoot the system and even tells how to remove and replace the drivers in case of problems. A full 5-year warranty is provided with each speaker. Although the speaker is rather tall and quite heavy, the center of gravity is low enough to resist toppling by all but the most forceful pushing at the sides. It should therefore be reasonably safe around toddlers.

## Technical Measurements

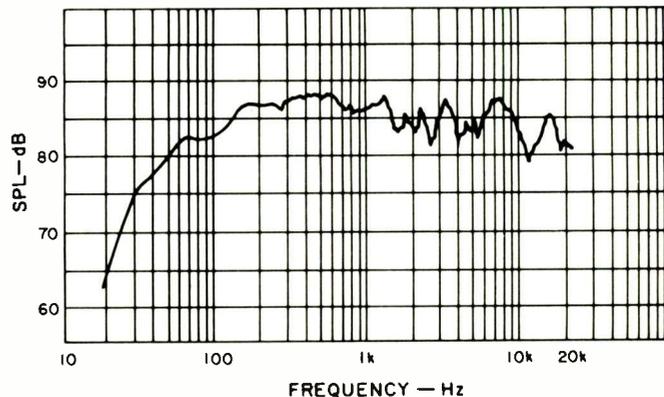
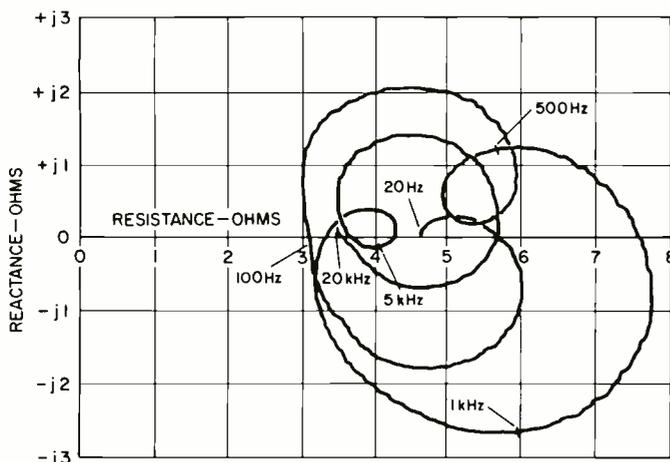
The magnitude of impedance load which the AR90 presents to a power amplifier is shown in Fig. 1. Since there are nine possible equalization switch positions, there will be nine separate impedance characteristics. Only the two most extreme positions are plotted, that is the positions which presented the highest and lowest values of impedance to the amplifier. The curve marked "0 dB" is the measured impedance for all equalizer switches in their indicated 0 dB position; the other curve is for all switches set to the -6 dB indicated position.

Figure 2 is a complex polar plot of the impedance from 20 Hz to 20 kHz for the 0 dB position. The lowest measured impedance value is 3.0 ohms, which is close to AR's stated minimum of 3.2 ohms. From the standpoint of power amplifier limitations, the most likely frequency where difficulty might occur is around 1.3 kHz, where the impedance is around 4.5 ohms with a 28 degree lag in phase angle. If the AR90s are positioned more than a few meters from the power amplifier, I recommend the use of large gauge wire in order to minimize not only power loss, but also modification in frequency response because of relatively low impedance. AR, for example, recommends 16-gauge wire for a run of up to 40 feet.

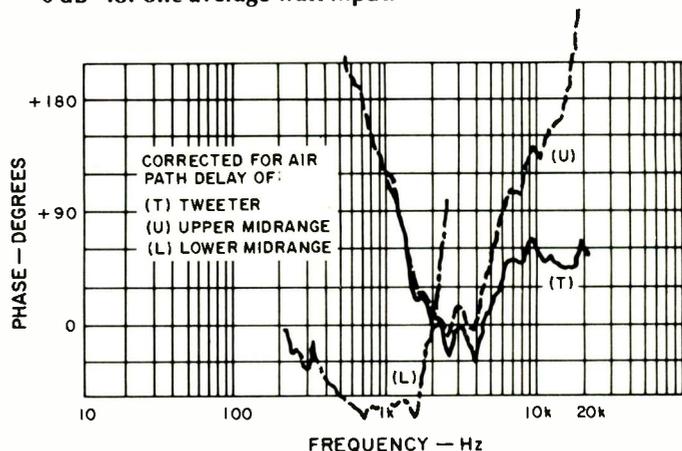
The measured one-meter-axial anechoic frequency response is shown in Figs. 3 and 4. Both measurements are made with the equalizer switches in their 0 dB position. The amplitude of SPL, Fig. 3, shows a gradual reduction of response with increasing frequency above 1 kHz. This is a very minor effect and amounts to about 3 dB per decade. The anechoic low-bass frequency response, taken on axis, shows a drop relative to the mid bass. This is presumably traceable to the AR philosophy of adjusting the response for more uniform low-bass spectral energy response when the speaker is placed along the wall of the listening room. Although the low bass is achieved from two 250-mm (10-in.) drivers directed to the sides, the one-meter anechoic response below 150 Hz showed essentially no directional characteristic within plus or minus 90 degrees of the frontal axis. In other words, the low frequency anechoic fall-off of Fig. 3 is due to the nature of free-field measurement and not of microphone position.

The one-meter-axial phase response is shown in Fig. 4. The measuring microphone was placed one meter from the front of the AR90 enclosure, and the air path delay is 2.907 milliseconds for this spacing. The measured tweeter delay is 3.071 milliseconds; the measured upper midrange delay is

**Fig. 2 — Complex terminal impedance with all equalizer switches set at "0 dB."**



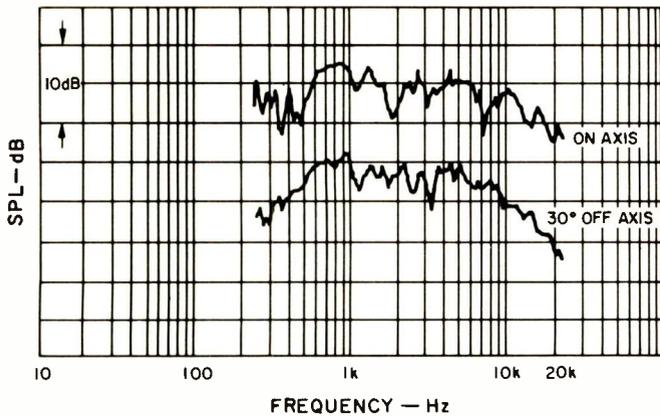
**Fig. 3 — Amplitude of the one-meter-axial anechoic frequency response with all equalizer switches set at "0 dB" for one average watt input.**



**Fig. 4 — One-meter-axial phase response corrected for the indicated driver locations and with all equalizer switches at "0 dB."**

2.976 milliseconds, and the measured lower midrange delay is 3.234 milliseconds. The phase measurements of Fig. 4 consist of three curves, corrected for each of these delays to show the absolute phase shift of the frequency response when corrected for driver delay. The reference for phase shift in these measurements is the zero degree condition where a positive-going sound pressure wave is produced by a positive-going terminal voltage, when airpath delay and driver delays are removed. With minor exceptions, each driver is essentially minimum phase, but the ensemble system, which defines the AR90, is of nonminimum phase type due to the variation of time delay throughout the frequency range. This time-delay variation does contribute to some of the irregularity in direct-sound frequency response, particularly at the frequencies where the acoustic transition between drivers takes place. (Editor's Note: AR feels that while such phase differences do exist, ones of this magnitude do not contribute significantly to listening irregularities.)

The more interesting frequency response, from the standpoint of listening quality, is the three-meter room response shown in Fig. 5. For this measurement the AR90 was placed in its recommended listening position in a room and the microphone was positioned three meters in front of the speaker and one meter above the carpeted floor, simulating a normal listening location, and this plot shows the frequency spectrum of the first 13 milliseconds of direct sound which arrives at the microphone location. This plot essentially shows the timbre coloration of the earliest sound arrivals for broadband impulsive program material.



**Fig. 5 — Three-meter room response with all equalizers set at "0 dB."**

Two curves are shown in Fig. 5. The top curve is the sound measured directly in front of the AR90 at the three-meter location and the lower curve is the sound when the microphone is moved 30 degrees off axis, so that the AR90 is in a conventional left-channel-stereo listening position relative to the microphone location. The curves are displaced 10 dB for clarity of presentation.

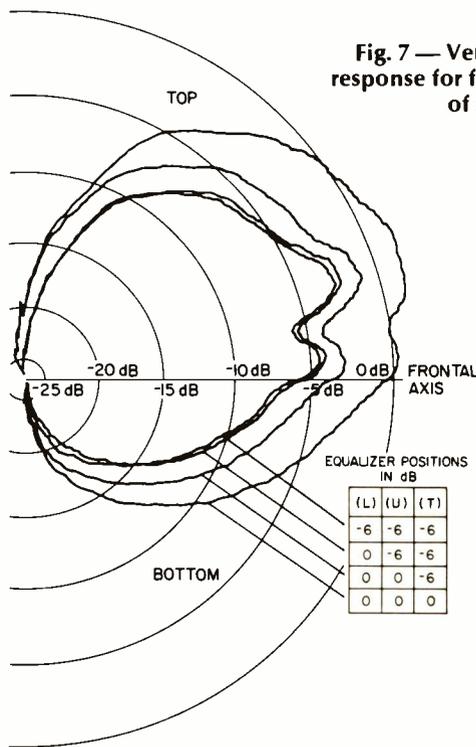
As might be anticipated, the highest frequencies are slightly more attenuated off axis than they are when listening directly in front of the speaker. The on-axis room response is essentially the same as the anechoic frequency response for components above about 600 Hz. Some floor and ceiling scatter show up below that frequency and may be due to the broader dispersion pattern of the mid-bass driver which handles frequencies up to 1200 Hz. The normal stereo listening position, lower curve, shows a similar rise in energy at around 1 kHz with a fall-off having less floor scatter below that frequency. The high-frequency beaming, which we noted in the earlier listening test, is evident in the difference between these two curves, and the improvement in higher frequency accuracy when a treble boost of 3 dB at 9 kHz was added in the listening test can be justified by the measured room response. On the whole, this is a relatively smooth room response; however, these measurements show that some mild high-frequency and low mid-bass boost may be needed to balance the spectrum of percussive program material.

Horizontal and vertical polar energy responses are shown in Figs. 6 and 7 respectively. This is a measurement of the total sound energy from 20 Hz to 20 kHz as a function of listening angle relative to the geometric axis of the loudspeaker. As might be expected, except for a drop in the highest frequencies, the horizontal angular dispersion is quite good within the normal plus and minus 30 degree angular positions for stereo listening, since the speaker drivers are arranged in a vertical line. In order to gain some idea of the directional properties for various AR90 equalizer settings,

these measurements were made for four settings: (1) all switches up and in their 0 dB position, (2) -6 dB for the high frequency equalizer, all others 0 dB, (3) -6 dB for both high and midrange, with low midrange at 0 dB, and (4) -6 dB for all switches. The only pattern change which can be discerned, other than total reduction in energy, is a fingered pattern at severe off-axis positions due to the tweeter apparently scattering off the grille assembly.

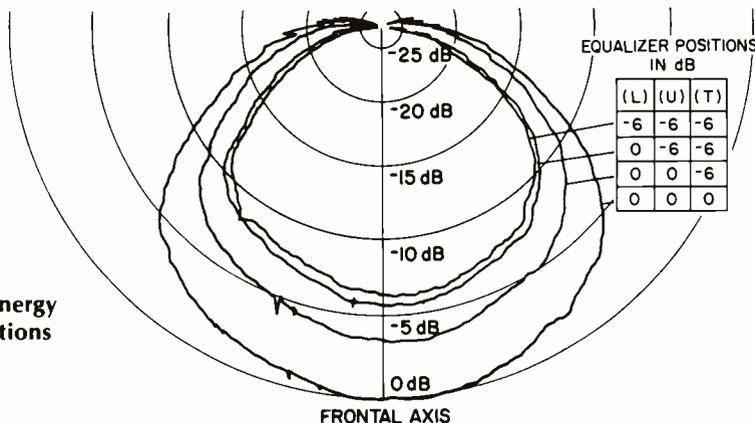
The vertical polar response shows a definite upward launching of sound energy with substantial energy variation in the 30 degree span above the central axis. A simultaneous measurement of anechoic frequency response (not shown) revealed a significant change in response over this range of elevation angles. This change is not due to grille assembly, but to the path-length differences between various drivers in this four-way system when those drivers overlap in frequency response.

These polar measurements indicate a fair amount of timbre alteration of the direct sound as a function of listening angle in the vertical plane. Substantial objects, such as large pieces



**Fig. 7 — Vertical polar energy response for four combinations of equalizer settings.**

of furniture which can reflect sound, should not be placed closer than about two feet to the side and front of the AR90s, nor should these speakers be positioned directly beneath deeply projecting shelves, if the most accurate sound is desired.



**Fig. 6 — Horizontal polar energy response for four combinations of equalizer settings.**

# The car stereo buyer's guide to the Audiovox range\* of sound systems for 1980:



**Model DGC-20**  
Electronic Tuning AM/FM Stereo radio with Cassette player and Quartz Clock



**Model DGC-10**  
Digital Display AM/FM/Stereo radio with Cassette player and Quartz Clock/Calendar



**Model CAS-600A**  
Super Power Stereo Cassette player with AM/FM/Stereo radio. Dolby®. 40 Watt output



**Model TPB-4000**  
Super Power 8-Track player with AM/FM/Stereo pushbutton radio. 40 Watt output



**Model CP-750**  
Stereo Cassette player with pushbutton AM/FM/Stereo radio. 4-Way balance



**Model ID-900**  
Digital Display AM/FM/Stereo radio with Cassette player and Quartz Clock



**Model ID-800**  
Digital Display AM/FM/Stereo radio with 8-Track player and Quartz Clock



**Model ID-675**  
Super Power Stereo Cassette player with AM/FM/Stereo radio. 40 Watt output



**Model ID-625**  
Auto-Reverse Stereo Cassette player with AM/FM/Stereo radio. 4-Way balance



**Model ID-500E**  
8-Track Stereo Tape player with Pushbutton AM/FM/Stereo radio. 4-Way balance



**Model ID-725**  
Stereo Cassette player with Pushbutton AM/FM/Stereo radio. 4-Way balance



**Model ID-605**  
Stereo Cassette player with AM/FM/Stereo radio. "500" Nosepiece for Import Cars



**Model ID-610**  
Stereo Cassette player with AM/FM/Stereo radio. Locking cassette controls



**Model C-977A**  
8-Track Stereo Tape player with AM/FM/Stereo radio. Special 4½" deep chassis



**Model ID-600C**  
Stereo Cassette with AM/FM/Stereo radio. Locking cassette Fast-Fwd. control



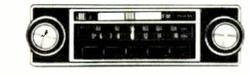
**Model ID-400C**  
8-Track Stereo Tape player with AM/FM/Stereo radio. 105mm Nosepiece. Track lights



**Model ID-300B**  
AM/FM/Stereo Pushbutton Tuning radio. Stereo Balance control. Slide-Bar band selector



**Model C-575C**  
Pushbutton Tuning AM/FM Stereo radio with "500" nosepiece designed for Import Cars



**Model ID-200B**  
Pushbutton Tuning AM/FM radio with Slide-Bar AM-FM Band selector. 4½" deep chassis



**Model C-506B**  
AM/FM Pushbutton Tuning radio with "500" nosepiece designed for Import Cars



**Model ID-100B**  
Pushbutton Tuning AM radio with illuminated Slide-Rule dial. 4½" deep chassis



**Model C-406**  
AM Pushbutton Tuning radio. Full-range tone control. "500" Nosepiece for Import Cars



**Model UC-20**  
Underdash Stereo Cassette player with FM Stereo radio. F.Fwd/Rewind/Eject cassette control



**Model UT-30**  
Underdash 8-Track Stereo Tape player with FM Stereo radio. Slide-Bar controls. Track lights



**Model C-981A**  
Auto-Reverse Stereo Cassette player with F.Fwd/Rewind/Eject. Underdash installation



**Model C-988**  
Underdash Stereo Cassette player with Slide-Bar controls. Auto-Manual cassette eject



**Model C-911A**  
8-Track Underdash Stereo Tape player with Locking Fast-Forward control. Track lights



**Model C-905**  
Underdash 8-Track Stereo Tape player. Super compact size. Track lights. Slide controls



**Model UC-10**  
Mini Underdash Stereo Cassette Player with locking Fast-forward control. Pushbutton eject



**Model C-902A**  
Underdash 8-Track Stereo Tape player with Slide-Bar controls. Channel lights. Compact size

## Available right now, a unique range of radios and tape players to fit every car.

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Audiovox autosound systems are designed and developed by the audio research laboratories of Shintom Co., Ltd., Yokohama, Japan.

\* Because of space limitations, we illustrated only 30 models. Audiovox has 109 more plus 77 car speakers and a full line of auto sound accessories.

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Harmonic distortion for the tones of  $E_1$  (41.2 Hz),  $A_2$  (110 Hz), and  $A_4$  (440 Hz) is shown in Fig. 8. Because the low-bass speakers handle frequencies below 200 Hz, the  $A_4$  measurement is an indication of the power handling capability of the 120-mm (8-in.) lower midrange driver, while the lower frequencies are handled by the two woofers. The distortion in these drivers is quite low, and the onset of distortion with increasing drive levels is a smooth rising curve.

Because the low-bass unit does not handle frequencies above 200 Hz, our normal IM test, where we evaluate the influence of low E (41.2 Hz) on upper musical tones, is of limited utility. Our earlier listening test had revealed some upper midrange harshness which might be due to crossmodulation effects, so an appropriate spectrum analysis was made to locate the possible source of such sonic effect, and a distinct crossmodulation was encountered in the upper midrange frequencies. The most prominent of these is shown in the IM results in Fig. 9. A tone of middle C (261.6 Hz) mixed

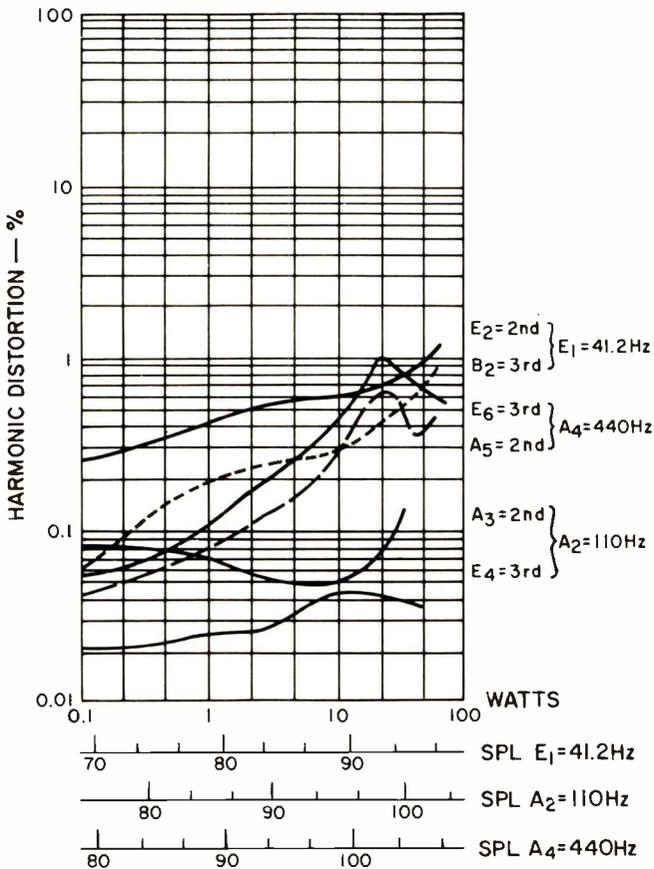


Fig. 8 — Harmonic distortion for the musical tones  $E_1$  or 41.2 Hz,  $A_2$  or 110 Hz, and  $A_4$  or 440 Hz.

in equal level with E in the octave above middle C (659.3 Hz) produced crossmodulation terms of 1057 Hz (which is twice  $C_4$  minus  $E_5$ ) and 1579.9 Hz (which is twice  $C_4$  plus  $E_5$ ). The net energy of these crossmodulation terms as a percentage of the generating tones is plotted in Fig. 9 for various average power levels from 10 milliwatts to 40 watts. Note that the percentage of this crossmodulation is still below 1.5 percent at 40 watts input.

Measurements of the AR90's linearity in acoustic transfer gain were made at frequencies of middle C and  $A_4$ . A perfect speaker will produce an increase in sound pressure level exactly corresponding to an increase in drive voltage over a wide range of signal voltage levels. The AR90 scored extreme-

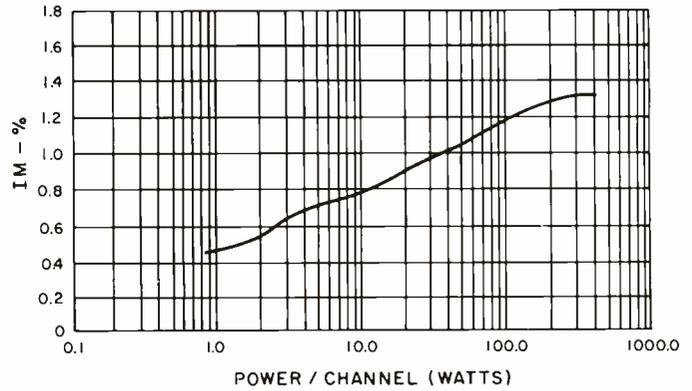


Fig. 9 — IM distortion produced by mixing  $C_4$  or 261.6 Hz and  $E_5$  or 659.3 Hz in equal levels.

ly well in this test with only a slight drop in acoustic transfer gain at 50 average watts and no perceptible gain variation down to levels of less than 0.1 watt.

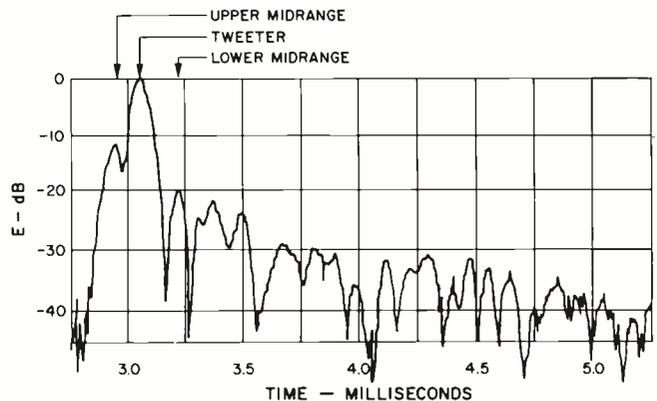
The AR90 also scored well in the crescendo test, with less than a tenth of a dB drop in acoustic level for these same tones, middle C and  $A_4$ , when the speaker was suddenly forced to handle broad-band noise which was 20 dB higher in average power than the power in the single tone. This test simulates the condition of an inner musical voice in a loud orchestral passage. The level of the inner voice should not change simply because there are other louder sounds present, and up to average powers of 100 watts, the AR90 passes this test quite well.

Both of these tests are searching for conditions which might lead to stereo image wander due to changes in program dynamic level. Many speakers have difficulty with this test, but the AR90 scored extremely well.

The one-meter-axial energy-time curve for the AR90 is shown in Fig. 10. This is a direct measure of the time spread of the impulse response of the system. The microphone is placed one meter from the front of the speaker. The first sound is due to the upper midrange, the 2- to 4-kHz range, and is evident in this measurement as the first energy peak at 2.976 milliseconds. The second energy peak at 3.071 milliseconds is due to the tweeter and represents energy above the 5-kHz range. The third peak at 3.234 milliseconds is due to the lower midrange driver. Since the measurement is that of the total energy from 20 Hz to 20 kHz, the tweeter is dominant in this plot due to the fact that it handles the largest bandwidth.

This test reveals a time difference in the sound coming

Fig. 10 — Energy-time curve.





DT 440

# MADE FOR EACH OTHER.

Earphones are made for ears. Yours. That's why the Beyer DT 440 has sound so natural and is so light and comfortable you don't even know it's there, even after many hours.

At 9.6 ounces, it is one of the lightest headphones available. And its weight is evenly distributed among the sponge-padded ear-cups and air-filled headband.

There's no great weight suspended from your head, and your ears never get squeezed.

Some people complain about the isolation of headphones that close them off from the world. So we built the DT 440 with a high velocity open design, to allow a natural mixture of recorded music and environmental sound.

How does it sound? Most

people say "spectacular." A great combination of impact and intimacy. The overall sound is wonderfully smooth and transparent. With clean, rich bass response. Powerful, lifelike midrange. Crystal-clear, undistorted highs. And perfect stereo imaging.

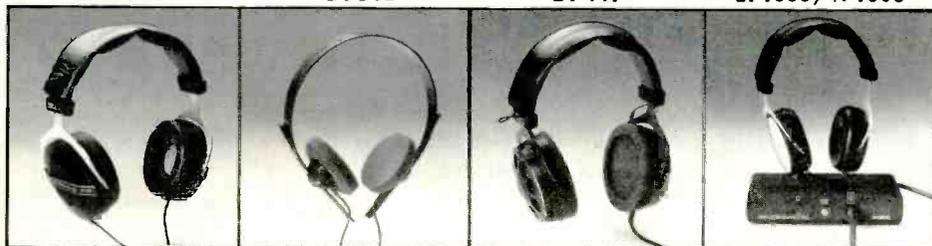
For sound – and for comfort – nothing beats a Beyer. We'd like to make one for you.

DT 220

DT 302

DT 441

ET 1000/ N 1000



**Beyer**   
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from the various drivers. There is some sound which scatters from the front of the enclosure, but this scattered sound is of low level and diffused in time relative to the first sound due to the speaker elements themselves. The energy-time contributions after 3.5 milliseconds are principally due to these scatter terms plus a general woofer decay.

### Listening Test

A number of listening positions were tried with the AR90, and it was finally determined that the most accurate conditions prevailed when these units were placed against a back wall and well away from side walls. After considerable experimentation with the various equalizer switch positions, I decided to leave them in their 0 dB position and do any necessary spectral touchup with conventional preamplifier tone control setting.

In this conventional stereo listening position, the bass is well balanced with respect to the rest of the reproduced spectrum. There is a mild bass peak somewhere around 100 Hz and then a shallow dip in the octave below middle C which I was not able to correct with conventional tone controls. There is a bass dominance when one is well to the side of these speakers. For normal listening positions, however, this should not be a problem, but when walking around a room, as one may do at a party where the AR90s provide musical entertainment, the effect might well be noticeable. This occurs principally in the low-bass region and appears due to the drivers which are positioned on the side of the enclosure.

There is a mild amount of high frequency beaming in this system. Normally, I would recommend rotating the speakers so that they point toward the preferred listening position, but

this does not work well with the AR90 due to the position of the low-bass drivers on the side of the enclosure. A better idea is to leave the enclosures flat against the wall and slightly raise the high frequency response with tone-control equalization. I found that such a treble boost, amounting to about 3 dB at 9 kHz, improved the balance of the highest frequency components to my ear.

In my opinion, the stereo image of these speakers has good lateralization but relatively poor depth, that is the illusion of depth was, for me, difficult to achieve, as I had the impression that much of the imaging was pulled forward and compressed in depth.

These speakers can handle extremely wide dynamic range material with no sign of breakup at the highest level. I did, however, sense two level-dependent problem areas: A mid-range harshness somewhere in the 1- to 5-kHz range which was most noticeable on female vocals, and the illusion that orchestral strings seemed to move and slightly change timbre, both with increasing level.

Some musical instruments, such as brass and horns, are reasonably accurately reproduced in my opinion, but other instruments, notably the piano, fall short of this standard.

Overall, there are several areas in which the AR90 measured well. These include relative smoothness in our three-meter room test, good horizontal dispersion, and low harmonic distortion. Two other areas of note were linearity of output with input gain and the crescendo test. To my ear, the system is reasonably well balanced overall, though a mild boost appeared to help the highest frequencies. I also sensed that the stereo stage was fairly well presented and that brass was the best reproduced instrumental class.

Richard C. Heyser

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The Signet MK111E is a major advance in moving coil cartridge design, with its Dual Moving Micro-Coils™ geometrically located for best separation and lowest distortion, and one of the world's smallest whole-diamond styli (just 0.0035" square).

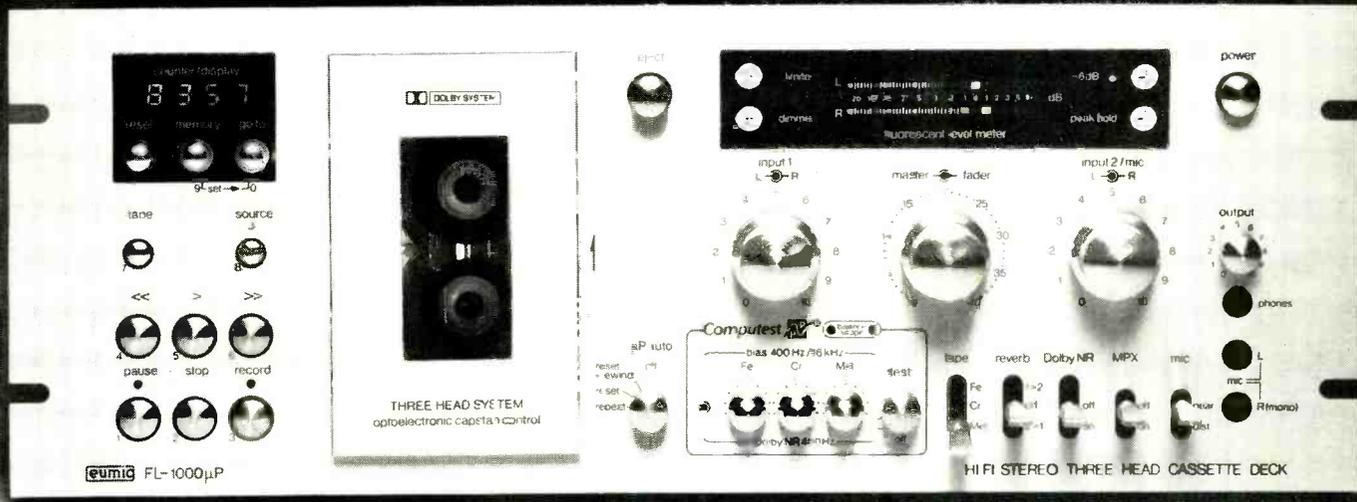
Hand built in small numbers, it is the perfect complement to the new fluid-damped XK50 Signetrace

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# Calling the FL-1000 a cassette deck is like calling a Ferrari transportation.

The owner of a Ferrari knows his car is much more than transportation. It'll get you there, but with a difference. A difference that comes from years of dedication to building precision machinery with an emphasis on performance and pleasure.

Similarly, anyone who uses the new Eumig FL-1000 immediately recognizes how much better it is—and how much more it does—than any other cassette deck. Much like the Ferrari, it is built for total satisfaction, to give top performance and instant response, where the competition just... works.

The FL-1000 has the most sophisticated microprocessor ever used in a cassette deck. It's so sophisticated, in fact, that it can be directly interconnected with most popular minicomputers through its standard IEEE buss for data storage and retrieval or automated music programming. The microprocessor provides logic-perfect tape transport supervision, plus automatic programmable stop and repeat. There's even an automatic searching mode to select any programmed point on the tape just by punching digits on the keyboard. The tape counter is purely electronic, with digital readouts, and the motor automatically slows when it approaches your selection and stops at the perfect point so you hear only what you programmed.

Our Computest automated test system and 400Hz and 14kHz test oscillators help you set optimum bias, equalization and Dolby™ levels for any tape, including the newest pure metal formulations. And our superb switchable limiter circuit—absolutely

undetectable in operation—assures distortion-free recordings with any tape or sound source.

Instead of clunking solenoids, the FL-1000 uses two electronically controlled motors for mechanical functions and to move the tape. The capstan motor incorporates Eumig's unique optoelectronic control. Instead of heavy flywheels and cumbersome belts, we use a low-mass disc with 2500 precisely photo-etched lines that are read by an optical sensor at the rate of 15,000 pulses per second. Speed correction is instantaneous, and wow and flutter are kept to an insignificant 0.035%.

Naturally the Eumig FL-1000 has three heads and double Dolby for true monitoring. And added flexibility is provided by two mixable stereo inputs with a cross fader, reverb without patch cords, fixed and variable outputs, fluorescent level meters with peak hold, and even a read-out that says "END" when the tape is finished.

If you want to understand and appreciate a fine car, a test drive is best. It's much the same with the FL-1000; so visit your Eumig dealer to audition the FL-1000 and the companion tuner, preamp and power amp. To set the right mood, make the trip in a Ferrari.



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# THE RATIONAL AMPLIFIER, FROM CROWN.

Sound reproduction systems of the 1980's will include "smart" components—components that react to their environment, that know how to protect themselves, and know how to keep functioning in that environment. They belong in your future.

The Crown Distinction SA2 stereo power amplifier is a rational amplifier. It analyzes its own behavior in terms of its immediate environment. It protects itself. It keeps on driving your speakers with power reserves that may amaze you. It's available now.

The SA2 has four on-board computers that constantly monitor and control the performance of the amp. The SA2 knows when it can use its full power capabilities, and when it has to cut back in order to prevent damage to itself.

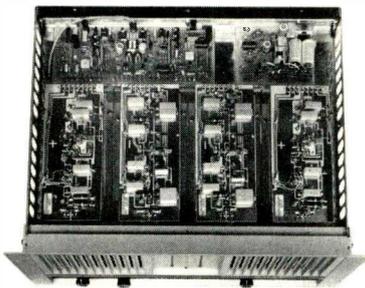
The SA2 is sonically so accurate that its distortion and response levels require highly sophisticated test instruments to measure. However you measure them, the SA2 translates into beautiful music.

The SA2 incorporates new system engineering concepts that won't easily be duplicated. It is unique.

## SOA—it's important!

The safe operating area (SOA) of a power transistor is defined by the internal temperature of the transistor. That temperature must be kept

below a critical level or the transistor will be damaged, an expensive and bothersome event.



Audio circuit designers have always known that SOA is difficult to measure, since it varies widely depending on what the transistor is being asked to do. Designers have had to estimate arbitrary limits for output voltage or current in order to protect output transistors, leaving much of the capability of the power transistor unused. Such designs are not as efficient as the SA2 has proven to be.

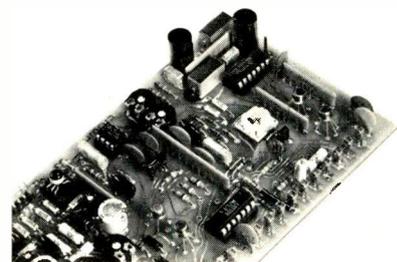
## SOA measured by Crown.

Crown's engineers several years ago developed a special test instrument to accurately measure the changing SOA of power transistors under varying loads. To the best of our knowledge, it's still the only such test equipment in the audio industry.

From the work done on this instrument, Crown developed the mathematics of output device behavior needed to design the computer-controlled protection system of the SA2 amplifier. That system makes it possible, for the first time, to utilize fully the capabilities of power transistors in an audio amplifier.

## On-board computing.

The SA2 protected-power system starts with the output transistor data developed by Crown, which is now in computer memory at Crown. Analog computer circuits built into the SA2 are programmed from data about the SOA of the output devices. The on-board computers obtain real-time input from sensing devices which report current, voltage and thermal behavior of the output transistors. The computers then describe, in real time, what the transistors have been doing, what they are being asked to do, and compute whether the result of all that could drive them outside their SOA.



If the on-board computers predict operation outside the SOA, the output is limited automatically and immediately. The computers also limit output only to the degree necessary, so that output power is always at the maximum safe level for the existing environment. The limiting is self-correcting, and full output power is automatically restored as soon as the demands on the output devices no longer threaten their SOA limits. All this happens in micro-second time, with the output devices being constantly checked.

## Continuing safe output.

Output power is never, in the Crown SA2 system, limited arbitrarily. Your

## SPECIFICATIONS

### Stereo Output Power:

220 WATTS PER CHANNEL MINIMUM RMS (BOTH CHANNELS OPERATING) INTO AN 8 OHM LOAD, 20Hz-20KHz AT A RATED RMS SUM TOTAL HARMONIC DISTORTION OF 0.05% OF THE FUNDAMENTAL OUTPUT VOLTAGE.

350 WATTS PER CHANNEL MINIMUM RMS (BOTH CHANNELS OPERATING) INTO A 4 OHM LOAD, 20Hz-20KHz AT A RATED RMS SUM TOTAL HARMONIC DISTORTION OF 0.08% OF THE FUNDAMENTAL OUTPUT VOLTAGE.

600 watts per channel minimum RMS (both channels operating) into a 2 ohm load, at 1KHz; rated RMS sum total harmonic distortion of 1.0% of the fundamental output voltage.

### Monaural Output Power:

700 WATTS MINIMUM RMS INTO AN 8 OHM LOAD, 20Hz-20KHz AT A RATED RMS SUM TOTAL HARMONIC DISTORTION OF 0.12% OF THE FUNDAMENTAL OUTPUT VOLTAGE.

440 watts minimum RMS into a 16 ohm load, 20Hz-20KHz, at a rated RMS sum total harmonic distortion of 0.08% of the fundamental output voltage.

1200 watts at 1KHz into a 4 ohm load, at a rated sum total harmonic distortion of 1.0% of the fundamental output voltage.

### Stereo Hum and Noise:

115dB below rated output, "A" weighted.

### Stereo IM Distortion:

Less than 0.01% from 0.25 watts to 220 watts into 8 ohms per channel.

### Stereo Slewing Rate:

Greater than 30 volts per microsecond.

### Stereo Frequency Response:

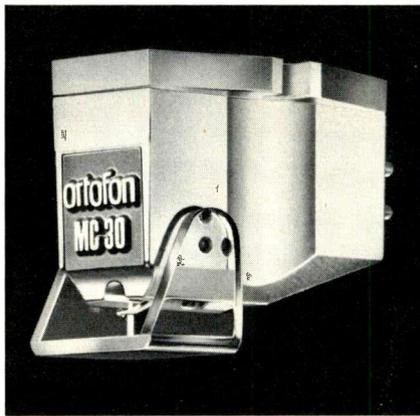
+0, -1.5dB, DC- 80KHz.



## Ortofon MC-30 Moving-Coil Phono Cartridge

### Manufacturer's Specifications

**Voltage Output at 1 kHz, 5 cm/S:** 0.08 mV (80  $\mu$ V).  
**Internal Impedance D.C. Resistance:** 3 ohms/channel.  
**Recommended Load Impedance per Channel:** 47 kilohms.  
**Vertical Tracking Angle:** 20 degrees.  
**Frequency Range:** 5 to 60,000 Hz.  
**Frequency Response:** 20 to 20,000 Hz  $\pm$ 1 dB.  
**Channel Separation at 1 kHz:** 25 dB min.  
**Channel Separation at 15 kHz:** 20 dB min.



**Channel Balance:** 1 dB max.  
**Dynamic Compliance at 10 Hz:** Horizontal, 13 x 10<sup>-6</sup> cm/dyne; vertical, 13 x 10<sup>-6</sup> cm/dyne.  
**Tracking Ability at 315 Hz at Recommended Tracking Force:** 75  $\mu$ m.  
**FIM Distortion at Recommended Tracking Force, DIN 45 500:** 1 percent.  
**Weight:** 7 grams.  
**Type of Stylus:** Fine-Line (modified Shibata).  
**Stylus Tip Radius:** 6  $\mu$ m.  
**Equivalent Stylus Tip Mass:** 0.4 mg.  
**Recommended Tracking Force:** 1.5 grams.  
**Price:** \$600.00.

### T-30 Transformer

**Type:** Toroidal.  
**Input Loading:** 3, 6, 12, 24 or 48 ohms and by-pass.  
**Output Loading:** 47 kilohms and 150 pF.  
**Frequency Response:** 4 to 120,000 Hz, +0.3, -3 dB.  
**Gain:** 20 to 32 dB.



**Channel Separation:** 5 Hz to 50 kHz, 50 dB; 5 Hz to 30 kHz, 60 dB.  
**Channel Balance:** 0.2 dB.  
**Square-Wave Rise Time:** 3  $\mu$ S.  
**Phase Linearity:** 10 Hz to 25 kHz,  $\pm$ 15 degrees.  
**Price:** \$500.00.

Although the principle of a moving-coil generator is quite old, as it was known in the days of Edison, Henry, and Tesla, the first moving-coil cutterhead was not produced until 1945. With Ortofon introducing its first moving-coil cutterhead in 1945, it didn't take long before people realized that there was no phono cartridge on the market good enough to provide sufficient challenge to the "new type" cutterhead. Thus, in 1948 Ortofon introduced the first moving-coil phono cartridge, a mono unit, with features that matched the quality level of their cutterhead.

The outward appearance of the Ortofon-MC 30 moving-coil cartridge is not unlike its predecessors, and it can be identified by its gold color. However, the design is quite different, i.e., newly designed cantilever, armature, coils, and a unique new damping system known as the "wide range damping" (WRD) system, which selectively damps resonances in the mechanical system and consists of two layers of special rubber with a platinum disc between them. At low frequencies the two rubber bearings enable the cantilever to make wide movements, while at higher frequencies the platinum disc acts as a sort of brake, progressively damping the movements with increases in frequency, so that at very high frequencies only the front rubber bearing is working. The MC-30 is highly compliant at low frequencies, and at high

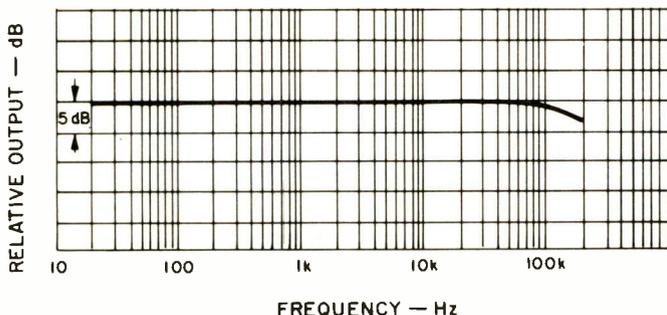
frequencies the design permits damping to be exerted. The newly designed, thin-walled aluminum alloy cantilever has fixed to it a 0.1-mm square nude diamond of Fine-Line (modified Shibata) shape which makes vertical contact with the groove wall over a wider surface than is done with elliptical or conical shapes. Further cantilever design permits the horizontal and vertical compliance to be identical, with a lower effective tip mass. The weight of the moving coils has been reduced by using copper wire of 30-micron diameter with only 20 turns per layer. Because of the minute size of the moving coils, the signal output is very low, and a step-up device is needed to raise the output voltage to a level that can be used with the usual preamplifier phono input stages. This step-up can be accomplished with a transformer or a pre-preamplifier, such as Ortofon's T-30 transformer or MCA-76 or MCA-10 pre-preamplifiers.

### Measurements

The MC-30 cartridge was mounted in a Technics headshell and used with the Technics EPA-100 tonearm mounted on a Technics SP-10 MkII turntable. Voltage step-up was via the MCA-76 pre-preamplifier as well as the T-30 transformer. Because the T-30 transformer was specially designed for the MC-30 phono cartridge, we decided to make all our measurements using the transformer and tested its frequency response from 30 Hz to 200 kHz to make certain that its output was flat to at least 50 kHz. The measured response was superb, -0.4 dB at 30 Hz, then slowly rising to 0 dB by 200 Hz and continuing at this level to 20 kHz, descending to -1 dB at 80 kHz, -1.75 dB at 100 kHz, and -3.5 dB at 200 kHz. The measured gain was 32 dB at the 3-ohm tap.

All measurements of the cartridge were made at a vertical tracking force of 1.5 grams, as recommended by the manufacturer, and with an anti-skating force of 1.7 grams. We might mention that our laboratory findings showed that a vertical tracking force of 1.7 grams and an anti-skating force of 2 grams improved the low-frequency trackability of the MC-30. However, we do not recommend a tracking force

Fig. 1 — Frequency response of the Ortofon T-30 transformer.



# Most direct drive turntables are a Cog'n' Pull Story.

There's a common problem shared by most direct drive motors: cogging. They cog because the spaces or "slots" between the magnetic poles of the motor exert a different force than the poles themselves. So you get cog and pull, cog and pull. Uneven rotation. Rumble.

## Two new turntables from Garrard. And no cogging!

Garrard's two new direct drive, single play turntables — the DD131 and DD132 — are free of cogging. But more. Garrard engineering has designed and incorporated the ingenious Fail-Safe Drive System that assures the user a powerful thrust and absolutely steady rotational speed.

## Three key elements.

One. The motor is the heart of any direct drive turntable. The new DC Servo-controlled motor, developed and built by Garrard, is brushless, coreless and slotless. It ends cogging by exerting a constant magnetic force during the entire 360° rotation of the platter!

Two. State-of-the-art speed monitoring. A Time-Integral-Velocity monitoring system instantly detects the slightest variation that could affect speed.

Three. "Hall effect" circuitry gives final assurance of precise speed by making instant correction of any rotational irregularity.

There it is. Garrard's Fail-Safe Drive System with a cogless motor, constant monitoring and instant correction.

## And still more.

The Fail-Safe Drive System by itself makes for a great turntable. But, in addition, both models boast the same ultra-light, 12-gram tonearm (including magnesium headshell!). Moreover, the drive system and tonearm are integrated with the silent, smooth and dependable Delglide® system. (You've seen the rave reviews.) and both turntables come with the now-famous Garrard three-year warranty. Differences? The DD131 is semi-automatic, the DD132 fully automatic.

## A great value.

Finally. There's the good news that provides as much reason to buy one of these turntables as their quality and features. The price: under \$200!

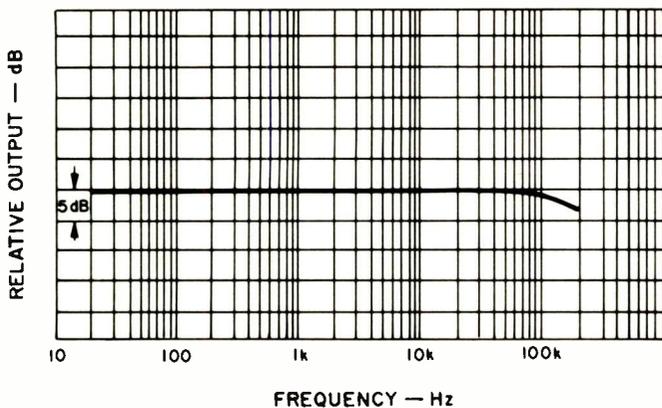
Write to us. We'll forward complete information about both of these handsome models. And we promise. No cog and pull stories.



**Garrard**  
More than ever.

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**Fig. 2 — Frequency response, left channel, and separation of Ortofon MC-30 moving-coil cartridge.**

greater than 1.5 grams, as suggested by the manufacturer. During the test period the average ambient temperature was 79 degrees F,  $\pm 1$  degree (26.11 degrees C) and the relative humidity was 60 percent,  $\pm 3$  percent.

To obtain cartridge/stylus lateral alignment to better than 0.003 in. and optimum tracing of the record groove, we oriented the MC-30 in the headshell and tonearm with the Dennesen Geometric Soundtractor (Box 51, Beverly, Mass. 01915). This stylus alignment tool compensates for any errors made in the tonearm design and manufacture, and automatically sets the appropriate overhang for any pivoted tonearm effective length.

Frequency response, using the Columbia STR-170 test record, is flat within  $\pm 0.5$  dB from 40 Hz to 3 kHz, then rises

to +1 dB at 5 and 6 kHz, dropping to 0 dB at 10 kHz, then again rising to +0.75 dB at 20 kHz. Its overall frequency response is +1 dB, -0.5 dB from 40 Hz to 20 kHz. Separation is 22 dB at 1 kHz, 21.75 dB at 10 kHz, 18.5 dB at 15 kHz, and 18 dB at 20 kHz. This separation is quite adequate for a well-defined stereo effect on playback.

The response to a 1-kHz square wave shows very little overshoot followed by ringing that decayed rapidly, with a stylus resonance of 41 kHz. This type of square-wave response is common with cartridges having an extended frequency response. The cartridge-arm low-frequency resonance was at 10 Hz and of 2.5 dB amplitude with the Technics EPA-100 tonearm. The vertical resonance was about 12 Hz in the same arm. In view of the low-frequency resonance, it is recommended that the MC-30 be used only in tonearms of medium to low mass.

The following test records were used in making the reported measurements: Micro-Acoustics TT-2002; Shure TTR-103, TTR-109, TTR-110, and TTR-115; Columbia STR-170, STR-100, STR-112, and SQT-1100; Deutsches Hi-Fi No. 2; Nippon Columbia Audio Technical Record (PCM) XL-7004, and Ortofon Direct-Cut Pickup Test Record 0001.

Wt., 6.56 g; d.c. res., 3.097 ohms; tracking force, 1.5 g; anti-skating force, 1.7 g; output (using T-30 transformer), 1.07 mV/cm/S; IM distortion: (4:1) +9 dB lateral, 200/4000 Hz, 1.8 percent; +6 dB vertical, 200/4000 Hz, 2.8 percent; crosstalk (using Shure TTR-109), 27 dB; channel balance, 0.25 dB; trackability: high freq. (10.8 kHz pulsed), 30 cm/S, mid-freq. (1000 + 1500 Hz, lat. cut), 31.5 cm/S; low freq. (400 + 4000 Hz, lat. cut), 24 cm/S; Deutsches Hi-Fi No. 2 300-Hz test band was tracked cleanly to 77 microns (0.0077 cm), lateral at 14.5 cm/S at +8.7 dB and 55.4 microns (0.00554 cm), vertical at 10.32 cm/S at +5.86 dB. The latter measurements are relatively

## Evaluation Equipment and Records

Besides the step-up devices mentioned earlier, the following additional equipment and specific records listed below, as well as many discs listed in past reports, were utilized in the listening evaluation of the MC-30 phono cartridge. The Technics SP-10 MkII turntable, Technics EPA-100 tonearm, Nikko Beta 1 preamplifier, Crown IC-150A preamplifier, the about-to-be marketed Audio Standards Corp. MSC-1 preamplifier, the Audire DM-700 power amplifier, a pair of stacked Duntech DL-15B speakers in each channel, and a Columbia SQL-400A SQ decoder. Each pair of speakers was connected to the Audire DM-700 power amplifier with PolkSound Cables using a Polk RC terminating network at the speaker end of each cable. The turntable was equipped with the Hiraoka Disk-SE22 turntable mat.

The following records were among those used to aurally assess the performance of the Ortofon MC-30 moving-coil phono cartridge:

### Stereo

Bethel College Male Chorus, Mogck — Ark Recording Co. (Minneapolis, Minn. 55442) 4079-S.  
 Caballé Sings Wagner, Lombard, Strasbourg Philharmonic Orchestra — RCA (Erato) ARL1-3351.  
 Verdi Overtures, Abbado, London Symphony Orchestra — RCA ARL1-3345.  
 Brahms: Sacred and Secular Choral Music, Corboz, Chorus of the Gulbenkian Foundation of Lisbon — RCA ARL2-3350.  
 Puccini: La Bohème (Caballé, Domingo, Milnes), Solti, London Philharmonic Orchestra — RCA ARL2-0371.  
 J. Strauss: Graduation Ball, Dorati, Vienna Philharmonic Orchestra — London CS 7086.  
 Stokowski Conducts Mahler: Symphony 2, "Resurrection," London Symphony Orchestra and Chorus — RCA ARD2-0852.  
 Mehta Bolero, Sensational Orchestral Showpieces, Mehta, Los Angeles Philharmonic — London CS 7132.

### Direct to Disc

Black Octopus, Paul Jackson — Toshiba-EMI EWLF-98006.  
 Orchestrations Astromantic, Otaka, Tokyo Philharmonic — RCA (Japan) RDCE-6.

Benny Goodman "The King" — Century Records CRDD-1150.  
 Evolutions I, Jon Jarvis, — Crystal Clear Records CCS 8004.  
 Flamenco Fever — M & K RealTime Records RT-107.  
 Hot Stix, Ed Graham — M & K RealTime Records RT-106.  
 Beethoven: Ode to Joy from 9th Symphony, Mitselfelt, Los Angeles Camerata Symphony Orchestra and Chorus — M & K RealTime Records RT-112.  
 The Power and the Glory (Vol. 1), Holzgraf (organist) — M & K RealTime Records RT-114.  
 Excitin' Latin!, Misago and His Cuban Boys — Toshiba/EMI LF-95013.  
 Times Gettin' Tougher than Tough, Musselwhite — Crystal Clear Records CCS 5005.

### Pulse Code Modulation (PCM) Digital to Analog

Epecially for You, Alex Blake, PCM Jazz in New York — Denon YX-7549-ND.  
 Knowledge of Self, Billy Harper, PCM Jazz in New York — Denon YX-7801-ND.  
 Generations Suite, Bridgewater Brothers, PCM Jazz in New York — Denon YX-7802-ND.  
 Mozart: Symphonies No. 38, "Prague," and No. 36, "Linz," Suitner, NHK Symphony Orchestra — Denon OX-7156-ND.  
 Après Un Reve — Romantic Cello Miniatures, Fujiwara, cellist — Denon OX-7147-ND.  
 Dvorák: The Complete Piano Trios, Suk Trio — Denon OQ-7440 — 42-ND.  
 J.S. Bach: Inventions and Sinfonias, BWV 772/801, Dreyfus (Harpichordist) — Denon OX-7150-ND.  
 Schubert: String Quartets No. 14, "Death and the Maiden," and No. 10, "Allegro," Smetana Quartet — Denon OX-7151-ND.  
 Danzas Fantásticas, Gould, London Symphony Orchestra — Chalfont SDG 302. (Denon records are distributed by American Audioport, Inc., Columbia, Mo. Chalfont records, Los Angeles, Cal. 90048.)

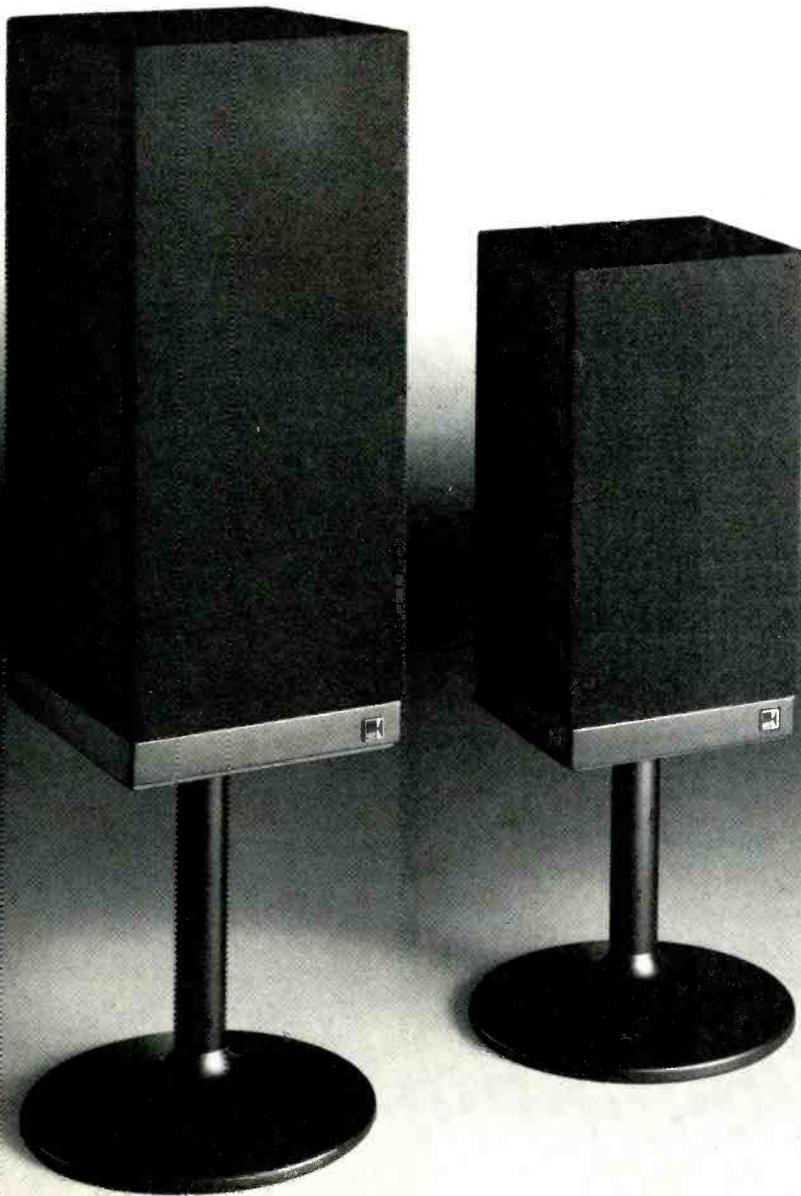
### Quadraphonic — SQ

The Concert of the Century — Columbia M2X 34256.  
 Three Penny Opera — Columbia PS 34326.  
 Secrets, Herbie Hancock — Columbia PCQ 34208.

**KEF Model 304**  
on optional stand ULS II

**KEF Model 303**  
on optional stand ULS I

Elegant, Efficient,  
Effective.

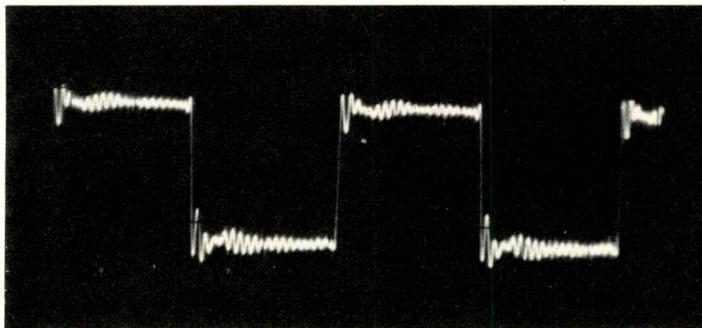


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**Fig. 3 — Response to a 1-kHz square wave.**



good, especially the vertical measurement, because not many cartridges can track the higher 300-Hz bands on this test record.

The Ortofon MC-30 along with its T-30 transformer was able to play all the tracking and transient ability bands on the Micro-Acoustics TT-2002 musical test record. The Shure Obstacle Course — Era III test record offered no challenge to the MC-30. The Shure Obstacle Course — Era IV gave the cartridge a workout, and only on band 5 of the harp and flute combination did the MC-30 become slightly strident with a hint of possible breakup. The MC-30 performed superbly inasmuch as very, very few cartridges are able to cleanly play all the bands on the Era IV test record.

### Listening and Use Tests

We perform our listening tests both before and after measurement. Unequivocally, the MC-30 has excellent transient response, sonic clarity, and transparency of sound. We did not find it to be bright despite the 1-dB rise in the 5- to 7-kHz region, and the bass was sonically well-defined and tight. Separation was rather well maintained, going beyond 20 kHz.

In the course of our listening tests, we used both Ortofon's T-30 transformer and the MCA-76 pre-preamplifier. Upon prolonged listening, we came to the conclusion that the superior characteristics of the MC-30 were not fully realized with either of these devices. Subsequently, we listened to the cartridge with the Mark Levinson JC-1DC pre-preamplifier and the new Audio Standards Corp. MX-10/A pre-preamplifier. The Levinson is, of course, a well-known unit and of excellent quality, but with the MC-30 the MX-10/A was clearly the unit of choice, as it neither detracted from nor embellished the virtues of the MC-30. Although we found the MC-30 to work quite well with all the step-up devices we tried, we concluded that the MC-30 and MX-10/A combination was superior to all the other combinations we tried.

Because of the excellent sonic quality of the MC-30, we evaluated it over a longer period than any other cartridge we have tested. We finally concluded that until something better comes along, the Ortofon MC-30 is the top moving-coil cartridge available today.

*B.V. Pisha.*

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## Bauman Research Pro-400 Stereo Preamplifier



### Manufacturer's Specifications

#### Phono Section (to Tape Out)

**RIAA Deviation, 20 Hz to 20 kHz:**  $\pm 0.2$  dB.

**Bandwidth:** 20 Hz to 400 kHz, +0, -3 dB.

**THD + Noise:** Moving-magnet phono, 0.01 percent; moving-coil phono, 0.02 percent; both at 2.0 V into 600 ohms and 1000 pF from 20 Hz to 20 kHz.

**S/N Ratio:** Moving-magnet phono, 82 dB re: 5 mV/input; moving-coil phono, 66 dB re: 0.5 mV input.

**Phono Overload:** Moving-magnet phono, 150 mV; moving-coil phono, 20 mV; both at 1 kHz.

#### High-Level Section (to Line Out)

**Bandwidth:** 20 Hz to 400 kHz, +0, -3 dB.

**THD + Noise:** 20 Hz to 20 kHz, 0.005 percent; 20 Hz to 100 kHz, 0.01 per-

cent; both at 2.0 V into 600 ohms and 1000 pF.

**S/N Ratio:** 88 dB re: 0.5 V input, 0.5 V output.

**Maximum Output:** 10 V rms at Amp output; 7.5 V rms at Main output.

#### General Specifications

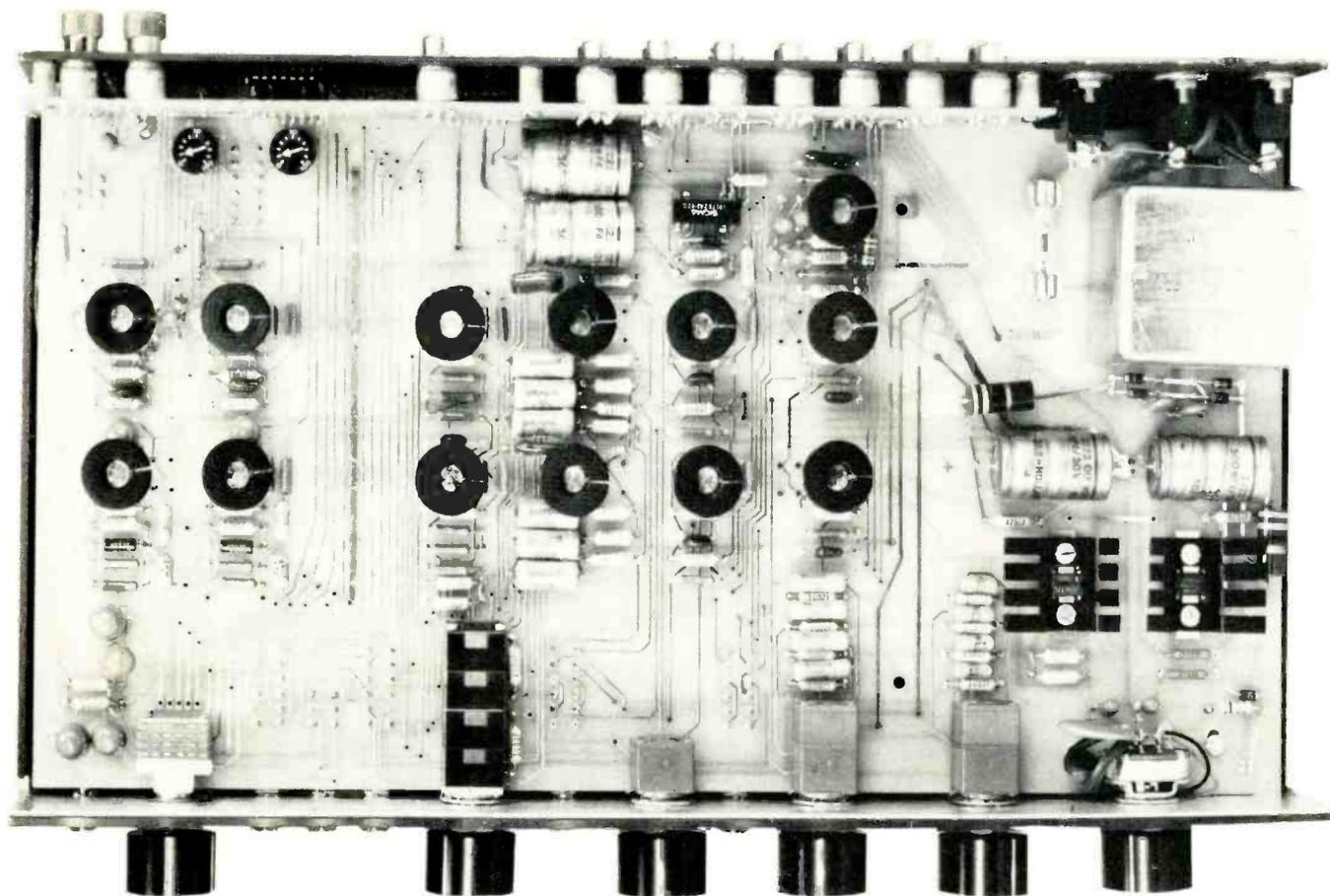
**Dimensions:** 14 in. (35.56 cm) W x 2.5 in. (6.35 cm) H x 9 in. (22.86 cm) D.

**Weight:** 5 lbs. (2.27 kg).

**Price:** \$1,050.00.

The Bauman Pro-400 preamplifier-control unit is a straightforward looking component which, upon first encounter, evokes the question: "Why is it priced so high?" After putting it through a series of bench and listening tests, the question is partially answered. Sound quality delivered by the Pro-400 when used in conjunction with a top-quality power amp is

certainly beyond reproach and there are definitely some rear-panel adjustment features which we found attractive and useful, but in our view, that doesn't fully justify the over-\$1,000 price tag, even though each one is being built by hand by the President and Chief Engineer at the company's headquarters in Rosenberg, Texas.

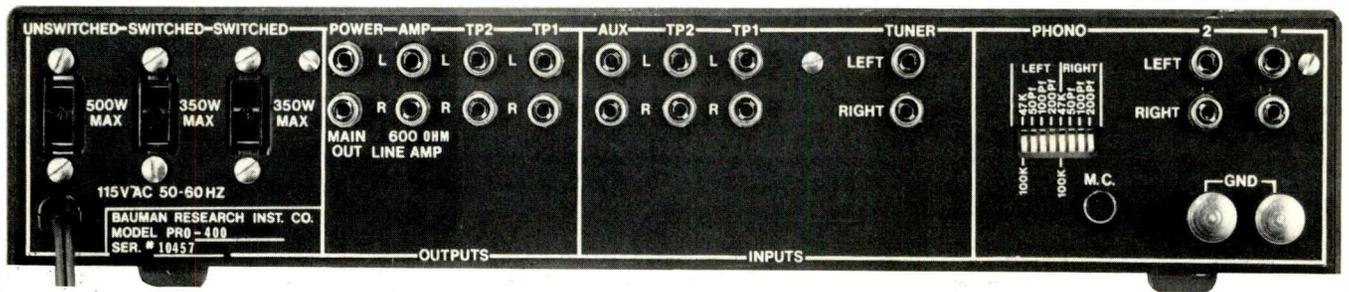


The front panel of the Pro-400 contains six identical large black knobs, one of which is for a rotary power on-off switch. Bass and treble control knobs come next and are common to both stereo channels. Balance and volume control follow, while over at the left is a selector switch with settings for two Tape sources, *Aux*, *Tuner* and *Phono*. Once in the *Phono* position, a pushbutton switch at the lower left corner of the unit selects *Phono 1* or *Phono 2*. *Tape 1/2*, tape monitor, and tape copy pushbutton switches are located between the selector and volume controls and almost a full page of the 13-page photo-offset (from a typewriter text) owner's manual explains how, by various combinations of the "TP1, TP2, TAPE MON" and "TAPE COPY" buttons, the user can do just about anything with two connected tape decks, such as dubbing from one to the other in either direction and monitoring of either one during the process, or dubbing while listening to yet another program source. Nothing truly unique here, but the unit is quite flexible. Additional push-buttons near panel-center introduce subsonic filtering and defeat the tone control circuits. That's it for the front panel, whose combination of controls places the Bauman Research preamp somewhere between the "straight wire with gain" approach and the "multi-control with lots of switches and knobs" approach.

The rear panel is probably more interesting than the front. To begin, it has two pairs of phono input jacks with matching ground terminals just below. You might guess that in a preamp with double phono inputs, one of the input pairs would be set up for moving-magnet pickups while the other would be for moving-coil cartridges. Not at all! There, nestled in the same area of the back panel is another pushbutton switch which, if depressed, converts *both* pairs of inputs to moving-coil levels. It has been our experience that most audiophiles will have both a moving-coil and a moving-magnet phono cartridge, rather than two of each type, and this arrangement of switches just doesn't cover what we feel is the most common situation.

Near the phono inputs are two banks of small rocker switches — one bank for each channel. These select either 47 or 100 kilohm input impedances for moving-magnet phono cartridges as well as loading capacitances which can be set to between 50 and 350 pF. Actually, only three fixed capacitances per channel are built in, 50 pF, 100 pF and 200 pF, but a table in the aforementioned owner's manual shows you how, by flicking more than one of the rocker switches, you can arrive at other capacitance loading values. A small screwdriver is required to activate the rocker switches — they can't be moved by human fingers which are too big.

Speaking of tables, the owner's manual devotes four full pages to a listing of just about every make and model of moving-coil and moving-magnet cartridge and tells you what resistance and capacitance loading should be used with each. In case you are now wondering how moving-coil cartridges can be included in that list, what with their low output-impedance requirements, fear not. Variable low-impedance loading for such cartridges has been included in the Bauman Research Pro-400 as well. The only hitch is that you have to remove the cover of the unit to get at them. You should follow the firm's admonitions regarding unplugging of the unit from a.c. power before poking around inside the unit, but once there you will find two small potentiometers inside, labelled *Left* and *Right*. These are calibrated in ohms, from 0 to 100, but what that really means is that additional "zeros" didn't fit on the small pots so, if you want a 500-ohm load value for your moving coil cartridge, you set each pot to 50 and mentally multiply by 10. Input jacks for the various program sources are centered on the rear panel, while outputs labelled *Line Amp* and *Main* are located next to two switched and one unswitched convenience a.c. outlets, none of which really has enough wattage capacity to work with a high-powered amplifier of the type that audiophiles using the Pro-400 are likely to want to connect. The *Main* output jacks will drive any impedance above 10,000 ohms, and the signal reaching them has been divided down by a full four-



section master volume control for best signal to noise at all volume settings. The line-output jacks, on the other hand, will drive a 600-ohm load impedance, but to do so required bypassing the last two gangs of the volume control and routing the signal directly from the output amplifiers, thereby negating the advantage of the four-section control.

Although page one of the owner's manual says that the second half of the manual contains detailed technical descriptions, we weren't able to find anything concerning specific circuit topology, so on to the bench tests ....

### Laboratory Measurements

RIAA equalization was absolutely perfect, with our VTVM needle remaining absolutely motionless as we switched frequencies from 20 Hz to 20 kHz using an inverse-RIAA input signal known to be accurate to within 0.05 dB across the audio band. THD through the phono inputs measured 0.008 percent at 1 kHz, 10 kHz, and 20 kHz, while for the moving-coil phono inputs, it measured just under the specified 0.02 percent. Moving-magnet IHF input sensitivity (for 0.5 V output) measured 1.5 mV, while through the moving-coil phono inputs, it was 0.15 mV, indicating that the pre-preamp circuit used provides precisely 20 dB of gain. High-level input sensitivity for the same 0.5 V standardized output was 46 mV. High-level total harmonic distortion measured 0.0035 percent at 1 kHz, 0.0035 percent at 20 Hz, and 0.004 percent at 20 kHz — about as low as our test equipment can reliably measure. SMPTE IM distortion measured 0.003 percent.

Signal-to-noise ratio through the moving-magnet inputs measured a very high 85 dB (referenced to 5 mV input and 0.5 V output), while through the moving-coil inputs, it measured 69 dB (referred to 0.5 mV input and 0.5 volts output). Both S/N figures are "A" weighted in accordance with the new IHF Measurement Standards. S/N for the high-level inputs, referred to 0.5 V input and output, measured 92 dB, "A" weighted. Phono overload for the moving-magnet inputs was 200 mV at 1 kHz, while for the moving-coil inputs, it measured 30 mV before there was any evidence of clipping

or overload. Frequency response for the high level inputs was flat from 3.2 Hz to 125 kHz, +0, -1 dB.

Range of bass and treble tone controls for the Bauman Research Pro-400 is shown in the spectrum analyzer sweep photo of Fig. 1, and the turnover points for both controls seem well positioned in that they do not affect midrange response materially. Maximum range of control for the bass control was  $\pm 11$  dB at 100 Hz, while for the treble control it was  $\pm 11$  dB at 10 kHz. Maximum output before clipping was 11.0 V rms.

### Use and Listening Tests

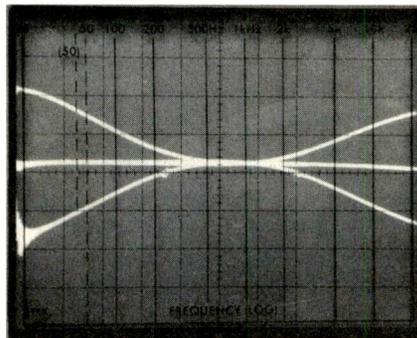
The cartridge loading system supplied in the Pro-400, despite its inconvenience for initial settings, is certainly a most useful feature of this product. We have long contended that the major differences heard between cartridges of similar price and quality was largely due to mismatching or incorrect loading, and a bit of experimenting with three moving-magnet cartridges in the \$100-plus range, connected alternately to the moving-magnet inputs of the Pro-400 and adjusted properly, again proved that this is indeed the case. Signal-to-noise ratio was audibly improved using both these moving-magnet cartridges and a couple of moving-coil pickups currently in the laboratory. We preferred using the main-amp outputs for connection to our reference power amplifier, especially since no long cable run was involved. The four-section master volume control does keep S/N at its best even at lower listening levels.

In truth, we cannot fault the sound we heard using the Pro-400 in any way. The subsonic filter (with its 3-dB cut-off at 13 Hz) introduces no audible bass roll-off whatever from any program material we were able to audition. Overall sonic balance was excellent, with highs particularly clean and devoid of any hardness often attributed to some solid-state preamp designs. Despite the question of the unit's price being only partially resolved, we are certainly willing to grant all sorts of accolades to Bauman Research for the basic bench performance provided by their Pro-400 unit, and cannot fault it sonically.

Leonard Feldman

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Fig. 1—Control range of the Bass and Treble tone controls.





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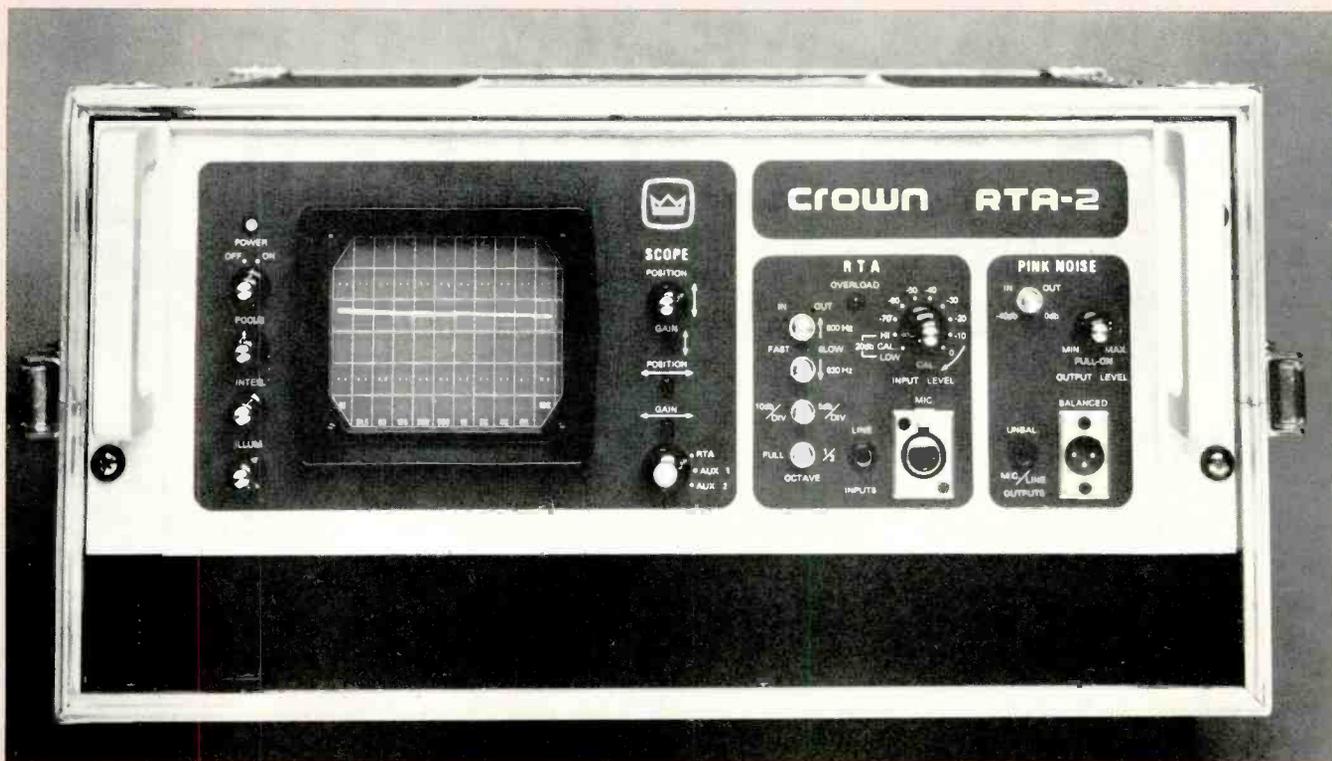
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## Crown RTA-2 Real-Time Analyzer



### Manufacturer's Specifications

**Frequency Range:** 16 Hz to 20 kHz.

**Bandpass Filters:** 32 single-pole-pair  $\frac{1}{3}$ -octave BW at  $\frac{1}{3}$ -octave intervals.

**Display Modes:**  $\frac{1}{3}$  or 1 octave, switch selected.

**Sensitivity:** 15.2 mV unbalanced, 0.76 mV balanced for full-scale indication.

**Display Accuracy:**  $\pm 1.0$  dB, full scale to -40 dB;  $\pm 1.5$  dB to -50 dB;  $\pm 3.0$  dB to -60 dB.

**Detector Filtering:** Dual section.

**Time Constants:** Fast, 15 mS and 47mS; slow, 15 mS and 375 mS.

**Noise Generator:** Pseudo-random type.

**Repetition Rate:** 2.1 seconds.

**Pink Filter Accuracy:**  $\pm 0.5$  dB from 16 Hz to 20 kHz, bandpass limited at 10 Hz and 40 kHz.

**Output Level:** Variable, 1.1 V rms maximum.

**Dimensions:** 19 in. (483 mm) W x 7 in. (178 mm) H x 16 $\frac{1}{2}$  in. (419 mm) D.

**Weight:** 22 lbs. (10 kg).

**Price:** \$2,195.00.

The Crown RTA-2 is an excellent configuration of a third-octave real-time analyzer and offers superior performance for a very reasonable price. The front panel is divided into three groups. The scope section uses a 5-in. CRT with an overlaid graticule. There are six vertical divisions, and scaling can be set for 5 or 10 dB/division. There are 11 divisions along the horizontal with octave-spaced center frequencies printed on the bottom, from 16 Hz to 20 kHz. The graticule, which adds blue filtering to the display, also has reference marks every one-fifth of a vertical division and every one-third division horizontally. The graticule itself has controllable illumination, a useful feature, particularly for photography or low-light-level situations.

There are also pots for controlling focus, trace intensity and vertical position, and three screwdriver-adjust pots for vertical gain, horizontal position, and gain. A rotary function switch selects *RTA*, *AUX 1* or *AUX 2*. *RTA*, of course, is the normal real-time analyzer mode. *AUX 1* or *AUX 2* selects inputs from corresponding jacks on the rear panel for displaying external signals on the scope. This is a nice feature and it could be extremely useful to some, while the manufac-

turer can include it at relatively small cost. *AUX 1*, for example, could be used to display an X-Y phase comparison, and *AUX 2* could be used to show a swept frequency response. Low-signal-level detectors help prevent CRT burns by gating off the beam if there are no deflection signals, another example of careful design.

The RTA section has inputs for both line (phone) and balanced mike (XLR). The input level can be attenuated up to 70 dB in 10-dB steps, plus the 40 dB available with a continuous vernier. The switch also has *HI* and *LOW* calibration positions which feed pink-noise levels 20 dB apart internally to the scope for system calibration, a feature overlooked by some manufacturers. There are four push-button switches which select fast or slow detector responses for filters from 16 Hz to 630 Hz and from 800 Hz to 16 kHz, vertical scaling of 5 or 10 dB/division and  $\frac{1}{3}$  or full octave display. Any overload is indicated by a red LED.

The pink-noise section has both balanced (XLR) and unbalanced (phone) output jacks. A button switch can be used to introduce 40-dB attenuation, which is necessary for microphone level outputs. The output-level pot is pulled out to

## A Brief Look at Analyzers

Whether we talk about music, noise or test signals, we can use either time or frequency domains. When such signals are displayed on a scope, we are observing the characteristics in the time domain. For steady test tones, such as sine or square waves, the display is steady and can be examined at leisure. We may know that the square wave includes odd harmonics of the fundamental, but they are not laid out for us to see what all the components are. Without considerable experience, the examination of noise (or music) with a scope is an exercise in futility.

We can, however, use some form of Fourier analysis equipment and examine the signals in the frequency domain. This process is spectrum analysis, although the term "spectrum analyzer" usually refers to an instrument which is swept-tuned, with a fixed i.f. and filter, detector and "video" filtering, or smoothing. The output is displayed on a CRT, perhaps a storage type for use in slow sweeps. A wave analyzer perhaps processes the signal the same way, but it may well be hand tuned, with a meter instead of a CRT. It is possible, of course, for analysis to be made with a set of full- or 1/2-octave filters, switching to each in turn for indication on a meter.

A great deal of attention in recent years has been given by both manufacturers and users to real-time analyzers. It may strike the observer of this scene that all equipments are not equal, or can't be, with prices ranging from \$200 to over \$20,000. In a great simplification, we can say that one man's "real time" is not another man's "real time." In one case, the criterion is that all incoming data are processed and displayed with essentially no delay. The criterion for the RTA types popular for equalization, however, is that the display show the entire spectrum continuously, showing changes only at a rate needed for the task. The time required to charge all of the filter, is accepted, as it is a small part of the time required for the task. This RTA design consists of a number of contiguous filters which are continually fed by the incoming signal. Most such units will not display the spec-

trum of a pulse, for the filter detectors are averaging type, rather than peak responding. The fast RTAs, however, using time compression or FFT techniques will even capture transients and display their spectra.

Turning our attention again to the spectrum analyzer (swept-tuned), we can see that it offers a major advantage over the lower-priced RTA (\$4,000 or less), and suffers a major disadvantage for some purposes. The major advantage is that the i.f. filter has very steep slopes and the bandwidth can be set very narrow. This is just what is needed for the examination of the harmonic structure of a signal. Noise contributions are also reduced, and discrete components more than 70 dB below the fundamental are easily examined. The major disadvantage is that because it is swept-tuned and displayed, portions of the spectrum are shown in turn over a period of time, rather than simultaneously. The narrower the filter bandwidth, the slower the sweep must be, adding delay between the first part of the spectrum and the last.

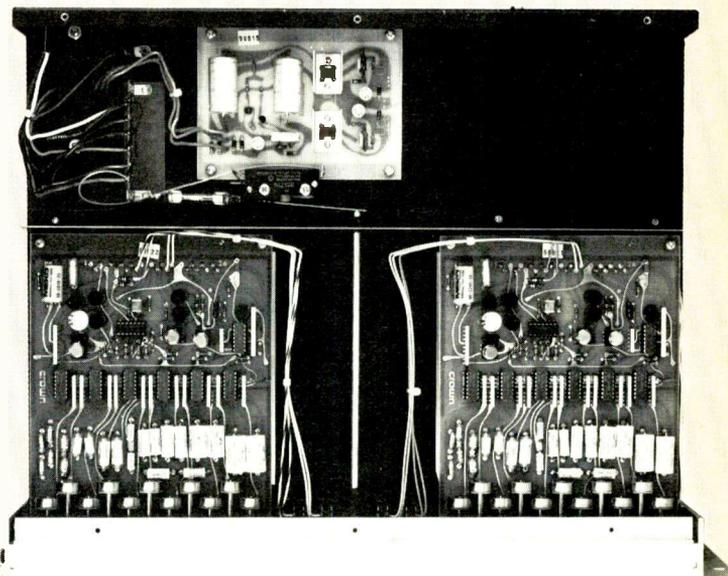
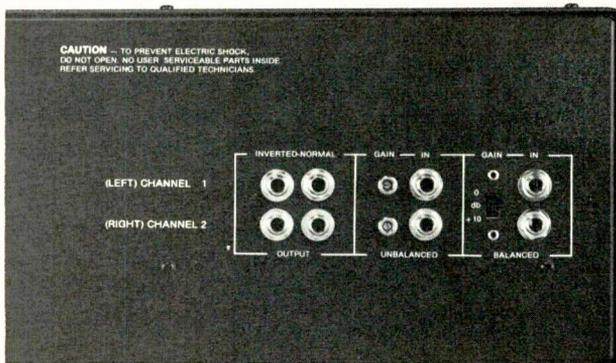
The spectrum analyzer is the required instrument for the analysis of the distortion products, swept response of filters, TDS (time-delay spectrometry), and other such tasks. (The high-priced RTAs may have such capabilities, although some are limited in dynamic range, in comparison.) In general, spectrum analyzers do not analyze or display noise well with log sweep, which is preferred for checking the frequency response of an audio system. When we want to look at noise levels on an octave or 1/2-octave basis, the contiguous-filter RTA gives us the display we want, with the total spectrum divided neatly into a number of bands. The constant-percentage bandwidth of the filters combines with a pink-noise input for a flat display when the response is flat. Unless its filter skirts are steeper than most, this type of RTA will not display low-level distortion products. For equalization, recorder alignment, and even program monitoring with fast time constants, however, these RTAs are the best choice.

H.A.R.

switch on the noise generator. On the rear panel, there are pin jacks for noise out, vertical and horizontal (sweep) out for external display, and vertical and horizontal in for both AUX 1 and 2. There are also screwdriver-adjust pots for setting both sensitivities for the two inputs. There is a line input phone jack, which is overridden by use of a front-panel input jack. The astigmatism control for the scope is on the cover over the CRT base.

Both top and bottom covers were removed to get a really good look at the internal construction and design. There were two large PCBs for the 32 filters, one above the other. The removal of five hold-down screws allowed the upper board to swing up on three post hinges, but it was still connected electrically with a multi-pin cable. This scheme is one

of the best I've seen for solid support of a PCB while providing ready access for adjustments and troubleshooting. The deflection PCB is mounted between the filter cards and the CRT. The input PCB, which includes the pink-noise generator, is mounted near the bottom of the unit. All of the solder-



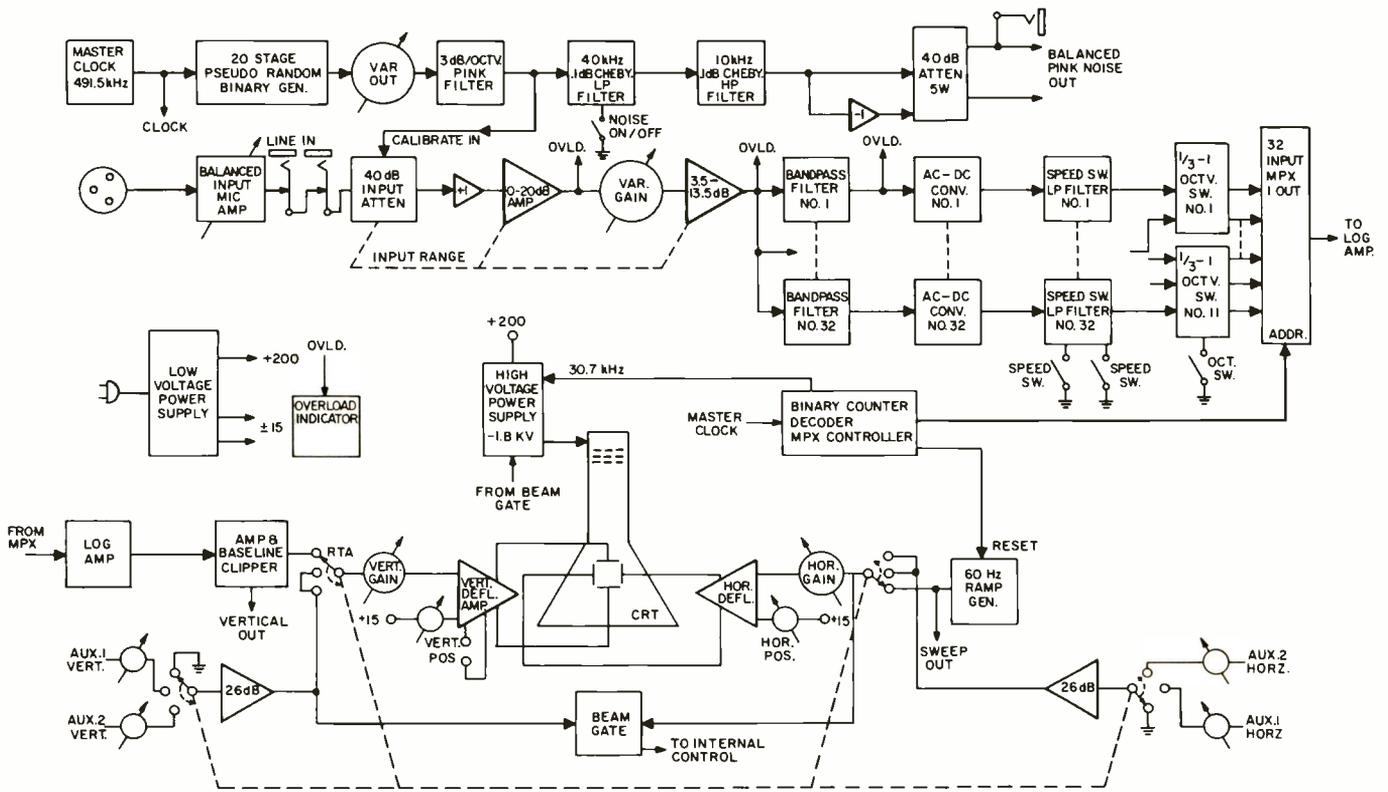


Fig. 1—Block diagram.

ing was excellent with very little flux residue. Components were of high quality, with precision polystyrene and polycarbonate capacitors and sockets for all ICs among the many examples. The line fuse was mounted internally in clips; my preference would be for an external holder. This is a very minor deviation, however, for this professional unit which is both rugged and refined.

### Circuit Description

Figure 1 is the block diagram of the RTA-2, and I expect that most readers will be able to follow the various signal and control paths. Do note that the 491.5-kHz master clock drives the pseudo-random noise generator as well as the filter multiplexer controller. One of the refinements of the unit's design is that there are FET speed, or smoothing, switches in each filter channel. The a.c.-d.c. converter, which is a precision rectifier, is followed by an op-amp with a 15 mS time constant, and it drives an RC network with a time constant of 47. mS. This configuration is used in all of the filter channels when they are set for *Fast*. When the speed switches are put

in *Slow*, the FET switches add 33  $\mu$ F to each RC net, increasing the time constant to 375 mS and smoothing the outputs greatly. CMOS switches are used to combine the outputs of sets of three filters to generate the octave-band display when this option is selected at the front panel. The filter multiplexer output feeds the log amp which drives the vertical channel of the scope. The horizontal 60-Hz ramp generator is reset with a countdown from the master clock.

### Performance

The first check made of the Crown unit was of frequency response with a CW input signal. The peaks of all of the filter responses were within 0.2 dB from 16 Hz to 20 kHz over a wide range of input levels and attenuator settings. The center frequencies were accurate with no exceptions, usually within 1 percent. The RTA-2 response to pink noise was checked using both the internal generator and a separate Gen Rad unit. Figure 2 shows the results on a separate storage scope. With the RTA-2's generator and fast filter responses, there is a noticeable spread at the lowest frequencies (5 dB/vertical

Fig. 2—Pink-noise responses. Top: RTA-2 source with filters on *Fast*. Middle: RTA-2 source with filters on *Slow*. Bottom: Gen Rad 1382 source with filters on *Slow*. (Vertical scale: 5 dB/div.)

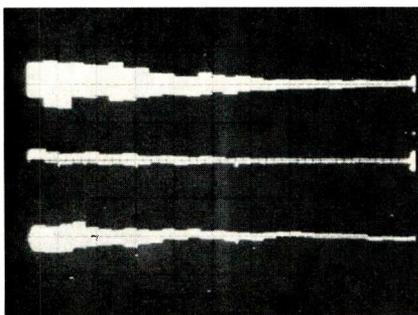
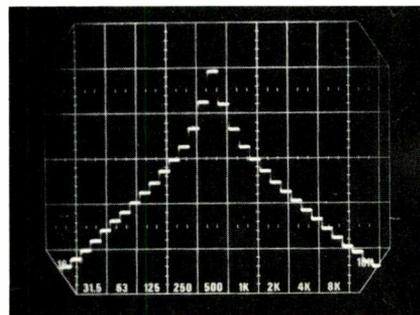
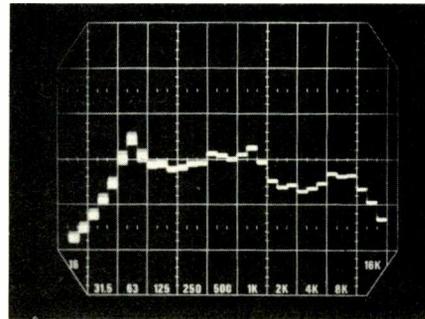
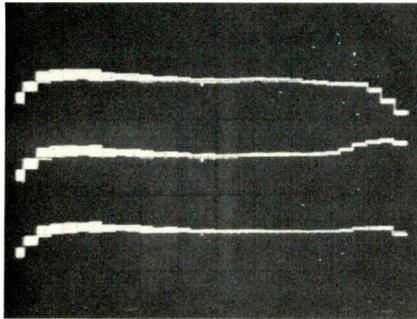


Fig. 3—Display of sound-system response. (Vertical scale: 10 dB/div.)



**Fig. 4—Response to a 500-Hz tone. (Vertical scale: 10 dB/div.)**



**Fig. 5—Tape recorder setup. Top: Response before head alignment. Middle: After alignment, but before bias and EQ adjustment. Bottom: After adjusting bias and EQ. (Vertical scale: 5 dB/div.)**

division). With slow filter responses, the spread is greatly reduced. Note that with the Gen Rad source and slow responses, however, there is a greater spread. The reason is this: The Gen Rad output is truly random, and it includes some output levels that occur infrequently. The pseudo-random noise of the RTA-2 does not include some levels of lower statistical importance, so there is less spread in the display for the same smoothing.

Figure 3 shows a typical filter response to a single tone, 500 Hz in this case. The Q is fairly high for the single-pole-pair design, and the final 6 dB/octave slopes are reached at about  $\pm 2$  octaves. Filter sections crossed over accurately in frequency at the desired 3 dB down. Levels could be set and read accurately, whether set to 5 or 10 dB/div. As received, the measured scaling was 4.9 dB/div for one setting, and 9.7 dB for the other. These are excellent results, and a little touch-up of vertical gain resulted in a figure of 9.9 dB/div over the entire 60-dB range — superb. The input attenuator steps were exactly 10 dB, and the vernier had a 74-dB range. The internally fed noise calibration levels were exactly 20 dB apart. Because the graticle is overlaid on the CRT, there is some parallax, which should be considered for high-accuracy work or making scope pictures. The range of the vertical position control was about three times the screen height.

The balanced-microphone input sensitivity was 0.71 mV, and that for the unbalanced line was 14.8 mV. The mike preamp gain can be adjusted internally from +10 to +26 dB; the RTA-2 is supplied with it set at +20 dB. The noise generator output was a maximum of 1.1 V, which the output pot reduced to 7 mV. With the 40 dB attenuation, the range was 11 mV maximum, down to 0.07 mV. All impedances were as specified. Checking the back panel jacks showed that the *Sweep Out* was from 0.0 to +10.8 V every 16.6 mS. *Vert Out* was an accurate 1V/10dB, with a range of 2 to 8 V, nominal. This output is not affected by the scope position setting. The *AUX* input sensitivities were 65 mV/div vertical and 50 mV/div horizontal. The input level pots allow reducing sensitivity to match high-level drive signals. With the removal of inputs, the low-signal-level detector gated off the CRT beam in 3 seconds.

### In-Use Test

The first step was to listen to the noise output from the Crown unit. There was a bump-like sound that occurred every 2 seconds, but it was a small part of the total output, a minor distraction at most. The knobs on the unit are of good quality, but I would prefer a bar-type on the attenuator for greater ease in turning. Figure 4 shows the use of the RTA-2 in doing recorder alignment. This is one of my favorite uses for a third-octave RTA, and the response to 20 kHz helped to do a good job quickly. Figure 5 shows the display of a sound-system response with an E-V RE-55 mike used for the pickup. It is obvious immediately that the tweeter output is on the

low side. A change in the level setting appears to be the best first step. The *Slow* response for the filters was used for these and other equalization-type tasks. The *Fast* mode was best for use as a music monitor, and it was very interesting to see the change in the display spectrum when changing types of music or to another FM station. Sharper filter skirts would have aided seeing the harmonic structure, particularly at the frequency extremes. A group of teenagers thought it was a marvelous addition to their disco lighting, and it certainly showed up well in the darkened room. Screen intensity could be set very high without significant trace widening, with the trace easily observable at a light level of over 3000 footcandles. That's outside, although not in direct sunlight which would probably need a shade.

There were a few times that I wished the RTA-2 included some form of memory, but including a storage-type CRT and its circuitry would have increased the cost significantly, to say nothing about the weight increase. Actually the purpose of the storage shown in Figs. 2 and 4 was to generate better illustrations for the article. The storage was not needed to do the tasks depicted; in fact, it delayed the recorder alignment. An LED type of display might have saved some space, but a good part of the total volume of the Crown unit goes with the excellent accessibility for adjustment and maintenance. An advantage of the analog display of the CRT is its higher resolution.

The instruction book consists of a three-ring notebook with a total of over 60 pages of material. There are several pages of general information and specifications, including response plots. It is true, as the manual states, that there are a good many possible uses, and some of them should have been more fully described to aid the user in the initial learning phase. There is an excellent block diagram, and some discussion of circuit theory, which would benefit from some expansion. There are excellent quality schematics and layouts of each of the PCBs. An interconnection diagram would be a desirable addition to facilitate following signal and power paths among the cards. There is a very detailed parts list, covering some 30 pages with each of the filter channels listed separately. Filter center frequencies should have been shown here, but were not. *In toto*, the information presented is quite broad, and there is great depth in important areas. The three-ring binder format should facilitate keeping the manual up-to-date, and adding application notes, troubleshooting guidelines, etc.

The Crown RTA-2 may now be purchased directly from Crown (\$2,195.00), and they are making an AKG C451E system available for just \$100.00! A portable field case is \$100.00; a shipping case is \$120.00. The RTA-2 offers outstanding performance for measuring system responses, equalization, recorder alignment, etc., for use in the laboratory, at the site, in the studio or on the road.

Howard A. Roberson

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# The bookshelf

*Dictionary of Scientific and Technical Terms*, 2nd Edition, McGraw-Hill 1978, 1848 pp., \$39.50.

This impressive volume contains 108,000 definitions and 2,862 illustrations covering its 8¾ x 11½ in. pages, almost 2,000 of them. There were a good number of contributors and editors to cover about 100 disciplines, which include acoustics, communications, electronics, engineering acoustics, mathematics, physics, and statistics. Because so many fields are covered, it is to be expected that there are some omissions.

Overall, however, there are many examples of careful selection and editing. There is an up-to-date definition for "Fourier analyzer," for example, and various transistor types are well covered. The individual entries evidence excellent editing — definitions identified for field, SI equivalents where units appear and good cross-referencing. The excellent illustrations are mostly line drawings, but there are some halftones. There are also useful tables, flow diagrams, and schematics.

The pages are slightly thin with a little leak-through from the back of the page. The terms are in bold face, however, and the type face used for the definitions is very readable. Included in the appendices are SI units conversion tables, abbreviations of terms and organizations, and semiconductor symbols and abbreviations. Yes, there's a lot contained, and it's well presented — for a good price. This dictionary will provide good support in your own field and aid investigations into others.

Howard A Roberson

*The History of Radio*. Five cassettes, \$9.95 each (also open reel, same price, and 8-track \$11.95). By mail: Satellite Broadcasting Co., P.O. Box 644, Matthews, N.C. 28105.

Five hours' running time! For a long time I kept putting off a trial, for lack of stamina. But one night I suddenly decided to give these a whirl. I ended up listening to every minute of those

five hours. An excellent job, mainly because it is done so simply — just a huge quantity of radio excerpts, in a number of lumped categories, rather neatly edited at good stopping points, and laced with minimum announcer identification, plus a few concise background accounts. It all flows very easily — it could so easily have been a mess! I was impressed.

Two groups of listeners will enjoy. First, of course, us old timers, who will be ever amazed, and amazed again, at the recall of programs, of styles, of sounds we thought we had forgotten or never heard at all. I was no radio listener in those days, but it seems I absorbed the stuff direct-to-brain or something. It all came through the way a forgotten highway opens up before you on a trip, after years of absence. The older you are, the better, of course; we begin here in the pre-Amos & Andy time and go on until the fade-out caused by television, when virtually all of this sort of programming shifted over to the new medium.

Second group is the nostalgia lovers and don't ask me how it will all sound to *them*. I found, for instance, that in spite of the minimal sound quality, with never a sibilant in a carload, I could easily understand everything, out of long practice; whereas I don't get a word out of most rock songs today that younger people understand with ease. Will they be baffled by English-minus-sibilants and plus noise? Maybe! It'll be very quaint, in any case.

Edward Tatnall Canby

*TV Antennas and Signal Distribution Systems* by M. J. Salvati. Howard A. Sams, 1979, 256 pp., \$9.95.

This volume is directed to the solution of TV reception problems, but there is a great deal that is applicable to FM, as detailed below. The first chapter is on antenna system basics such as wavelength, impedance, bandwidth, and gain. There are some excellent comments on the various antenna gain references, plus material on

S/N ratio and reception range. The next chapter covers VHF antennas, with different design approaches discussed along with particular commercial products. The performance comparisons add to the value of the section, which has some material specifically on FM reception.

The chapter on UHF antennas is another good one, but the following one on all-channel configurations has more for the FM owner. There are good physical and electrical descriptions and performance reports. The chapter on transmission lines is brief, but it is excellent — both concise and lucid. There is discussion of performance, both wet and dry, and the costs and installation ease of various cable constructions. Baluns and other signal-distribution components are treated extensively in the following chapter. Mast preamps, pads, and connectors are also covered. Antenna hardware and accessories get 18 detailed pages, and guying, lightning protection, and rotators are also in there.

"Signal Optimization Techniques" and "Designing the Antenna System" contain much helpful information that does not appear in most texts covering the same general area. What is included will be of value to the professional as well as to the hobbyist who needs installation guidelines or has a problem to solve. The final chapter covers the actual installation and construction tasks. Two appendices list abbreviations used in the book and a directory of manufacturers. The index is of good length and detail. It would be improved further with added cross-referencing.

The entire text is well written, and there are many pertinent illustrations. Numerous practical comments increase the value of the book, which has a great deal of information for a modest price. The omissions in the area of FM reception were well covered by the same author in the January to April, 1978, issues of *Audio*.

Howard A. Roberson



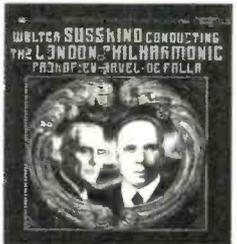
Gould



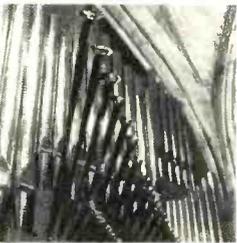
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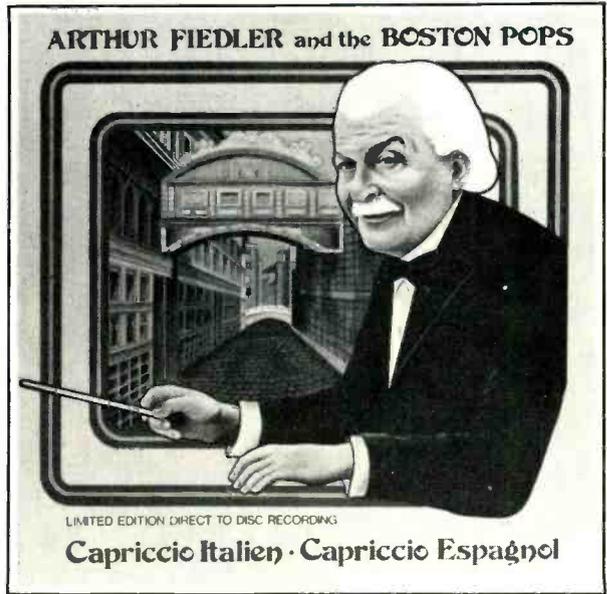
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# European letter

Donald Aldous



one of the early production 44s to play with, I can say that it is unlikely this unit will be outdated, as any future developments in any program source or circuit technology can simply be accommodated by adding a new input module.

After attending some concerts in London's Royal Festival Hall, or any other major auditorium in Europe, one always comes out as I did (after a recent performance by The Philharmonia Orchestra, conducted by Riccardo Muti, of several of Tchaikovsky's works) asking: "If

today's amplifiers are so perfect, why does it still sound better in the concert hall?"

PJW has answered this recurring thought in current QUAD advertisements, which I think are worth quoting:

"In real life, the sounds from all the instruments and sometimes parts thereof are independently radiated and so are not 'phase locked' together nor are they subjected to common eigentones. These mutually incoherent wavefronts are subjected to tiny but important reflections at the pinna and finally end up as just two channels representing the pressure at the two ear drums. It is not possible to achieve this transfer accurately by means of loudspeakers or headphones, however good these components may be.

"Nevertheless with good amplifiers and loudspeakers (and on those occasions when the people at the recording and transmitting end get it right), a musical experience can be achieved which is extremely satisfying and one

This column could easily be devoted to a eulogy of one man—Peter J. Walker, a modest engineer who has nothing to be modest about. The audio products of his firm, The Acoustical Manufacturing Co., Ltd. of Huntingdon, Cambridge, are known throughout the hi-fi world under the brand name QUAD and have rightly earned a legendary reputation.

The latest QUAD 44 Control Unit is now available and is an extremely versatile and practical unit. The controls consist of a stepped and carefully balanced volume control working in feedback over the main amplification stage, giving an improved S/N ratio at normal control settings. The variable low-frequency filter, long known as a strong plus point in QUAD designs, together with Treble and Bass lift and step controls, permit the listener to correct for certain loudspeaker and room coupling effects.

The QUAD 44 has five inputs, *Disc, Radio, AUX, Tape 1 and Tape 2*, selected by push buttons. All switch-

ing is electronic and completely silent. An important innovation for QUAD is that all five inputs are on identical format boards and can be changed to meet the user's requirements. For example, a third tape input or second disc input can be added in place of the auxiliary input.

Each tape input has five record-output levels and five input sensitivities. Every commercially available tape machine (whether cassette or open reel) can be matched. The standard disc input has three sensitivity settings and two capacitor loads and again will cope with virtually every currently available moving-magnet cartridge, as well as moving-coil cartridges of medium to high output. In addition, optional modules are available to match low-output moving-coil cartridges and microphones.

The QUAD 44 is designed for use with any power amplifier having a sensitivity of 5 volts or less, including the QUAD 303 and 405 amplifiers. As a sound man fortunate enough to have

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LIFESAVER with Disc Protec formula has already stood the test of time, and rigorous examinations in the laboratory and in the field. It has been enthusiastically endorsed by FM stations, disco operators, and major component equipment and record manufacturers.

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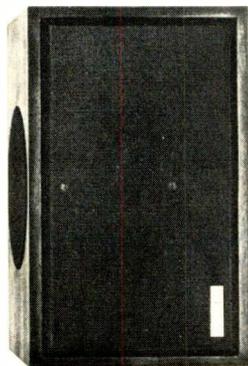
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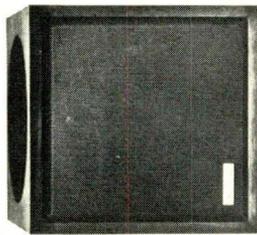
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of the greatest pleasures of our time." Yea, verily.

### New Quad ELS

As far back as 1936 Peter Walker was dreaming about producing a high-grade electrostatic loudspeaker, culminating many years later in the famous full-range ELS system widely used in the last 20 years by music lovers everywhere, despite such critical epithets as "looking like a firescreen" applied to it by some people, particularly the ladies.

PJW has just unveiled his latest ELS baby, which certainly has been a long time in gestation, but Peter does not take his births lightly. Based on the design concept that the ideal loudspeaker would behave like a pulsating sphere—which is not practical to construct—the new QUAD ELS system has a flat electrostatic diaphragm driven by a number of concentric rings. The signal is progressively delayed to the outer rings by the amount that would correspond to the air waves' delay, if the theoretical sphere could radiate, as it were, through a window of speaker dimensions.

The prototype model recently demonstrated at an AES meeting in London created a most satisfying sound and will attract a lot of hi-fi enthusiasts when production models become available. This pulsating sphere idea is particularly interesting to me, as many years ago it was propagated by the late Dr. Hermann Scherchen, conductor and audiophile. I had many talks with him on this topic in his Gravesano home in Switzerland and in London when on his concert or lecture tours. A working design, using a myriad of small driver units (moving-coil) in a spherical format was experimented with, I recall, but the performance did not meet the theoretical requirements.

Although claiming no business acumen, Peter James Walker, born in London in 1916, built up his very successful QUAD company by effort, perseverance, and adherence to his belief that "music" reproduction is the end product of all his design work. Today his co-designer is Mike Albinson (largely responsible for the revolutionary QUAD 405 power amplifier), while the business side of the Acoustical Manufacturing Co. is handled by his son Ross.

For relaxation, PJW plays the flute in local orchestras, listens to records, and goes sailing-dinghy racing. Many of us still recall with affection his collaboration with the one and only Gilbert Briggs for his Royal Festival Hall live-versus-recorded music concerts back in the mid-'50s.

One cannot but admire PJW's personal and technical integrity, a combination not so common in today's commercial world.

### Dutch Flowering

Launched at the end of June to the technical and trade press, Philips Electrical's Audio Division has an exciting new range of hi-fi items appearing under the title "Black Tulip." Why so called? The name recalls the struggle for perfection experienced by Cornelius Van Wit, the dedicated horticulturist in the novel by Alexandre Dumas. This unusual name reflects the quality, says Philips' PR department, of the equipment, based on several years of research and development.

Initially the Black Tulip range will comprise two complete separate systems (tuner, preamp, and power amplifier), receivers, timers, record decks, cassette decks, a semi-pro open-reel tape deck, and a new batch of motional-feedback and passive speaker systems.

Briefly, the AH-180 digital tuner, AH-280 preamp, and the AH-380 power amp have some noteworthy features; for instance, the AM/FM tuner's digital tuning system can, in addition to its AM/FM programmable memory, automatically and sequentially search through a pre-specified waveband. Altogether up to 12 separate stations can be accommodated within the memory, each of which is keyed-in by the listener.

The AH-799 digital receiver has a programmable memory which permits the listener to select up to nine pre-set station frequencies, and the memory selects not only the station frequency, but also the correct waveband. The digital LED readout converts into a digital clock when in the "off" position.

The AF-977 is an automatic belt-driven turntable with digital speed readout, and a quartz phase-lock-loop control system for extremely accurate speed control. The AH-585 and AH-587 motional feedback speakers incorporate a transducer mounted on the bass unit cone which monitors the cone movement before feeding the output signal to a comparator circuit. This signal is then compared to the speaker drive signal and the latter corrected accordingly.

The "Black Tulip" range will be phased into the British market over three stages, but as in other countries, the products will all begin to be manufactured for initial release by September, 1979. They are also being produced for Belgium, The Netherlands, Austria, and Japan. 

AUDIO • November 1979

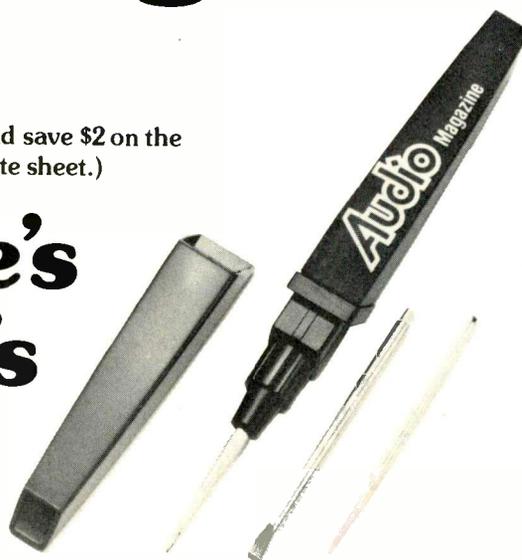
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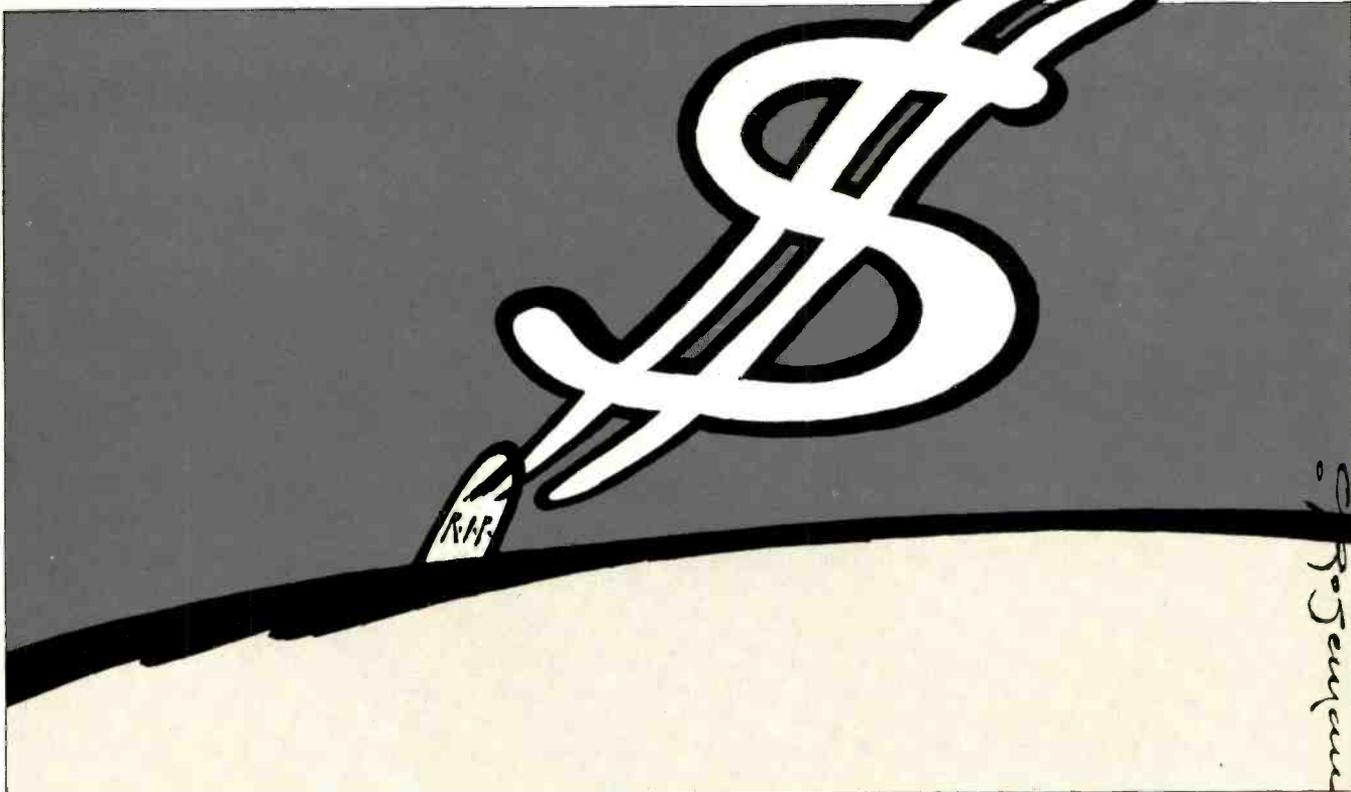
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# The column



**Born Again:** Randy Newman  
Warner Bros. HS 3346, stereo, \$8.98.

The first thing you gotta remember about the songs of Randy Newman is that he is almost never the person singing them. Someone else, some other character is doing that, and to get at what the song's really about, you've gotta consider the source-point.

Whew! I'm glad I got that said. Now we can get to **Born Again**, Randy Newman's glorious, nasty, brilliant, caustic new album. **Little Criminals**, the last one, was a big breakthrough in the marketplace, leapfrogging to gold on the power and controversy of *Short People*, a hit single at least as misunderstood as anything Randy has written. His comments on the matter could be the opening song, *It's Money That I Love*. The guy on the cover sings it, Newman painted up in neo-Kiss makeup with dollar signs on his eyes, white clown-colored skin, and a green fright wig. The third line goes right after the expectations the album title sets up as he sings, "I don't love Jesus/He never done a thing for me/It's Money That I Love." From here on out

every song doubles back to the title as the whole album is populated with people who are not what they were, having been born again.

*The Story of a Rock and Roll Band* could be sung by a young rock fan who is obviously very "into" ELO. The history of that group as it appears in the song is almost entirely spurious. Its arrangement deliciously sends up the pompous grand arrangements of Electric Light Orchestra, and they deserve it, too.

*Mr. Sheep* contains some of the cruelest lines Randy has ever written. Some young twerp sings it as he harasses a commuter type who seems to be minding his own business. The song cuts both ways, harshly at the commuter — "Tell me, how's your little family?/How's your little wife?/Are you going to live with those monsters/For the rest of your life?" — and reflects even more miserably on the young idiot singing it.

*Pretty Boy* and *Ghosts* are flip sides of a many-faced coin. *Pretty Boy* is an encounter song of a disco dandy crossing someone else's turf and facing gang harassment. Strong language

here. *Ghosts* is sung by an old man whose neighborhood has changed all around him as his friends either died or moved out and up, leaving him alone in his room terrified to go out into the mean streets and the dangers on them. He is so defeated that he must even apologize for being scared.

*They Just Got Married* is very funny. The story of a happy young couple, it has the coldest, funniest, pithiest line of the record, "Anyway she died." *Spiestells* of a whole class of the born-again, those changed by a new or no identity into agents of espionage — they're everywhere. *The Girls in My Life (Part I)* is also a silly, funny one that might just be as close to autobiographical as Randy gets, but more likely it's purest fabrication. *Half a Man* risks the ire of the gay community, as they will no doubt misread this tale of a pitiful old queen — "He waved his hanky at me" — confronted by a truck driver.

*William Brown* is quintessential Newman. A North Carolina tobacco man picks up and moves to Omaha. And stays there. That's all. With Randy's sensibilities it wouldn't

surprise me if this little epigram is his favorite of the bunch for the way it plays with our expectations of a song. When nothing happens we feel cheated. Is that fair?

Then there's *Pants*, sung from the point of view of a rock and roll star who can't be older than 3½. A big production number this.

Every single song is about people caught up in flux, in circumstances they cannot divine. Every song is sung behind the mask of a different character. A different, fully defined character.

And more. Randy Newman, in the tradition of his uncles Alfred, Emil and Lionel of movie fame, is a stunning arranger. He knows when to punch hard, when to soft-peddle. His string parts are perfect. He never goes for the big wash with strings, instead getting the nuance and hint of texture. One arrangement consists of only two notes from the strings at the end of a song on which he otherwise plays solo on piano.

Randy Newman commands enormous respect from those he works

with. The musicians are the best, and for Randy they play their best, too. The producers are people he has worked with for years. Lenny Waronker has produced all of Randy's albums, and Russ Titleman has co-produced all since *Sail Away*, the first that had any real pop potential; since Russ has been aboard, each album has outsold the one before it. Also with Randy from the beginning is engineer Lee Herschberg who mixed and mastered the album while Tom Knox took over the session duties. The technos deserve special credit, for *Born Again* is as good sounding and recorded an album as any commercial album has been all year. From the softest whisper to a roar, the album is as clean as anything short of digital or direct disc.

Okay, I'll say it flat out. *Born Again* is more than just another in the brilliant succession of albums Randy Newman has made. It is a masterpiece. Really. M.T.

Sound: A                      Performance: A+

**Americathon**, Original Movie Sound-track

**Columbia JS 36174**, stereo, \$7.98.

As I write this, the movie is not quite released, but since it is based on a play by Phil Proctor and Peter Bergman, formerly half of Firesign Theatre, it could be an uproariously sick laff riot. Or it could just be sick.

In any case, the soundtrack album is all music — a new Beach Boys tune that is surprisingly good; two new Eddie Money songs, a rocker and a ballad, and two Elvis Costello songs of which one, *I Don't Want to Go to Chelsea*, has not been released in America before and the other, *Crawling to the U.S.A.*, is brand spanking new. And that's all on side 1.

Side 2 is somewhat lighter weight.

Nick Lowe's *Without Love* is a catchy C&W song that appears on Nick's recent *Labour of Lust*. *Car Wars* is a snappy Tom Scott instrumental. *Don't You Ever Say No* is sung by the unknown Zane Busby (she is featured in the cast). Finally Harvey Korman with a brief, unbilled assist from Meat Loaf (who is also in the film with Costello) do the nasty satiric *Gold*.

Actually an interesting album. Dunno who will buy it unless it's Money and Costello fanatics. Slight, but very amusing.

Well, the film will long since be out by the time you read this and will either be a hit or have sunk without a trace. Let it be. M.T.

Sound: B-                      Performance: B-

## The Clash

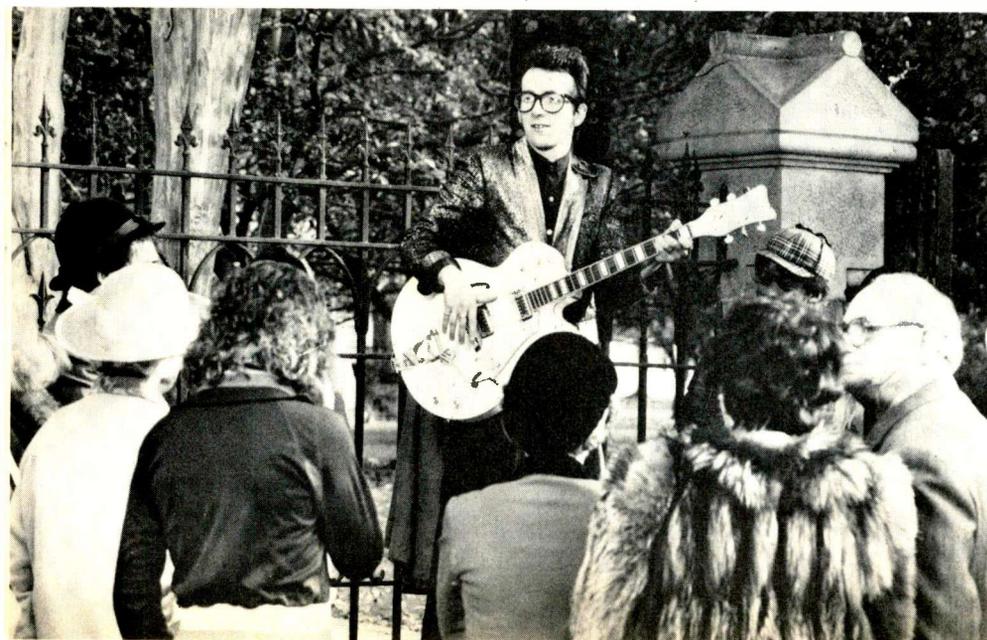
**Epic JE 36060**, stereo, \$7.98.

The Clash's first album is finally available in the United States, mildly disfigured but none the worse for wear and tear, and although it may be much older than *Rope* it carries far more exuberance and raw passion than the stultified previous LP. The people at their record company have seen fit to include two of the finest cuts The Clash ever cut, *Clash City Rockers* (B+) and the legendary *Jail Guitar Doors* (A) here, as well as several other only-available-as-singles tracks. The continuity of the album is somewhat disrupted — perhaps they should have had a side of the best tracks from the first album and another side full of the later recordings — and some of the best material still escapes release here (*City of the Dead*). Then again, one has the mildly amusing experience of hearing *Complete Control* sequenced right after *Remote Control* and now radio stations are starting to play *I Fought The Law*. If the group does make it here, something which I hardly expect, though there is some small possibility, chances are it'll be for all the wrong reasons.

This is the album The Clash made before they ever hit America, and they were still heavily under the influence of The Ramones musically, although with The Ramones you detect that there's a tongue firmly in cheek, while these guys never crack a smile. There are some excellent tracks from this album, and the cover of *Police & Thieves* will probably get some radio play (next to the track by The Police, of course), but the standout track is definitely *Jail Guitar Doors*, a Mott The Hooplesque tale of Peter Green, Wayne Kramer (a guess), and Keith Richards that the rest of the album can't match for intensity. Even the newer cuts, like *Gates of the West* and *Groovy Times* (included on a bonus single), can't match this one for power. The fact that *Jail Guitar Doors* finally got released here is some sort of testament to an accidental sanity that strikes record companies once in a full moon, and excuses the absence of *Pressure Drop* and whatever else didn't quite make it.

But the question still remains: Can The Clash be successful in America? Two years ago people were dismissing punk rock because America wasn't in as bad shape as England was, that kids weren't fed up enough with "the system" here to get into the spirit of bands like The Clash and The Sex Pistols, that it was too comfortable here for punk rock to take hold. Now nobody has the money to buy any re-

Elvis Costello



cords at all, and America is in an economic situation that makes Britain's crisis of two years ago look like paradise by comparison — so where does that leave The Clash? Your guess is as good as mine, mate. J.T.

Sound: B Performance: B+

**No. 1 In Heaven:** Sparks  
**Elektra 6E-186**, stereo, \$7.98.

If at first you don't succeed, try try disco — this seems to be the motto of Sparks, whose albums/singles have been released on practically every record label there is ... without success. About five years ago it looked like they were going to be a phenomenon in England with a single called *This Town Is Bigger Than Both Of Us* (which hit Number One over there), but they failed to maintain their standings in the pop polls, concentrating on America where no one would lend an ear. And just when you thought they'd tried everything, their latest album hits you square in the face with its Giorgio Moroder (famed for his work with

Donna Summer) production, lack of guitars, and spaced-out disco approach.

Granted, The Rolling Stones and even The Kinks have put some of their tunes to a disco beat, but this is a full-fledged entry into the bump and grind synthesizer market without even a twinge of rock. But even with the big beat pounding away, they can't mask Russell Mael's vocals enough — he sounds like some twit being goosed every time he opens his lips. Of course, he's never been anything but a novelty singer, but somehow with the raunch of a guitar behind him or the emphatic drums of Hilly Michaels driving through, he was almost convincing in a rock format. Ron (his bro') Mael still writes interesting melodies, and his synthesizers are more melodic than your usual disco devices, but unless the Studio 54 crowd takes these boys in as camp faves, Sparks is on the verge of destroying a career that was minimal to begin with. J.T.

Sound: B+ Performance: D+

**High Contrast:** Tim Moore  
**Elektra/Asylum 6E-179**, stereo, \$7.98.  
**Duty Now For The Future:** Devo  
**Warner Bros. BSK 3337**, stereo, \$7.98.

If these albums superficially seem to have nothing in common, guess again: Both are produced by ex-Bowie co-producer Ken Scott, and the man's highly overrated engineering abilities and almost nonexistent production skills have put the careers of these artists in total jeopardy. In the case of Devo, their talent and attitude seem deserving of stuntedness — they are quickly becoming the band I love to hate, except I'd rather ignore them completely than take the time to give them any consideration whatsoever. However, Tim Moore is a truly talented songwriter who, after four albums, is better known for his cover versions (The Bay City Rollers' *Rock 'n' Roll Loveletter*, Art Garfunkle's *Second Avenue*) than for his own recordings.

Devo is one of these concept bands that can't really play but have a grand idea of what they should look, act, and sound like so they get away with not being musicians. Their first album had a few catchy things on it but suffered from wishy-washy production. This one is even worse. It's as if the production had deteriorated even further but they forgot to write the songs before going into the studio. Their rhythms aren't as innovative as they seemed last time around, and the guy's voice just doesn't do anything for me — it's a one-joke act. De-evolution is their motto, and I guess they're following through since their first self-produced single (*Mongoloid*) was the best thing they ever did, and their records have devolved steadily ever since.

Tim Moore has yet to come up with the right combination on record — he almost had it on his second LP, but it (like all his other records) had a horrible cover which discouraged listening to the great music inside. Perhaps it's because he takes so long between albums, or maybe it's because his last was such a stinkeroo, but after four records you'd think he'd be a little better than a total unknown. At least on his latest he's written a few rock 'n' roll tunes, which is what he's best at, but you really have to listen between the grooves to appreciate them since the sound of the record is horrendous. Ken Scott allowed him to play most of the instruments when he's not really capable of making his songs sound killer that way (the old Pete Townshend demo syndrome), plus the drum sound on the LP is one of the most limp ever to be found on record. Maybe Tim should get his pal Keith Richards to produce his next one, but mak-



ing records like this is only good for one thing — getting other people to re-record the tunes to make them sound the way they should have in the first place. J.T.

Sound: D- Performance: C

**The Lodger:** David Bowie  
RCA AQL-1-3254, stereo, \$7.98.

**Stateless:** Lene Lovich  
Stiff/Epic JE 36102, stereo, \$7.98.

As the same old David Bowie finishes the third part of his trilogy (**Heroes** and **Low** started this musical sojourn into Eno's fantasy), a pretender to the throne, Ms. Lene Lovich appears on the scene and is heralded as The New Bowie. If these albums be any indication of what they have to offer — although even that is disputable for artists who don and cast off musical facades as easily as a new boyfriend/girlfriend/itfriend — you can have them both. While Bowie seems intent

on retrospectively glancing at his own musical past through gritted teeth, Lene is just a poseur who tries to combine Bowie's synthesized approach with Sixties schlock most ineffectively. It's truly amazing how much you can get away with these days if you've got enough hype behind you.

Mr. Bowie reprises *Calling Sister Midnight* (a tune he wrote with Iggy Pop which was just a paraphrasing of Stevie Wonder's *Superstitious*), calling it *Red Money* — instead of writing new songs, he just uses old ones as vehicles for his new lyrics. *Fame* finds new life as *Yassassin*, *Heroes* he regurgitates as *Boys Keep Swinging* . . . I could go on, but why bother? If these tunes surpassed the originals I could see the reason for **The Lodger** — at least for a few moments on *Pinups* he manages to get beyond what he's copied — but Bowie isn't quite as talented a self-plagiarist as Ray Davies or Elvis Costello. I'm sure that his record company and fans from his most popular days (*Young Americans* and *Fame*) will

be relieved that this trilogy is at last complete; I understand that many disco/R&B fans who became introduced to Bowie through his danceable singles felt that they got burned with his last two albums. The thought of people dancing to Eno's treatments on *Soul Train* was too much to bear, and while I'm curious to hear his next record, this one won't last long on my turntable.

Lene is heavily stylized dreck — all the trappings of the Devo/Talking Heads/Bowie/B52s school of modern music, but there's virtually no substance behind it. If she hadn't appeared on the scene, she wouldn't have been missed. With the Stiff Records label behind her, she has instant credibility in hip circles, but I guarantee if she came out on Arista or Columbia, she would have been forgotten without a trace. You wouldn't have heard any complaints from yours truly.

J.T.

Sound: C Performance: None

**Candy-O:** The Cars  
Elektra 5E-507, stereo, \$8.98.

There is a deliberate avoidance of hooks on the second album by The Cars; where most of the songs on the first album were perfectly constructed, the tunes on this one seem disjointed. Although I've been assured that **Candy-O** will grow on me, only *Let's Go* (the opener) and the title track have really done anything for me. The rest of the album seems like song fragments, none of which fall into place comfortably. I keep trying to make ex-

cuses for why I don't like it, but when it comes down to it, I believe that this album is — at least compared to their debut album — thoroughly unlikable.

Perhaps they figured that since their last album went double platinum, they're entitled to put out whatever they please and not worry about its commerciality, thus choosing to purge all pleasant portions of music from the album. Or maybe Ric Ocasek is afraid of losing touch with his New Wave roots, so he made an album that sounded less like a pop group and

more like Suicide (*Shoo Be Doo*). It has been suggested that The Cars' lack of success outside of the U.S. (they flopped in England) prompted an album which is aimed at the European market. Whatever the reason for **Candy-O** sounding the way it does, I only hope that Ric Ocasek hasn't written himself dry, as the potential shown on the first album cannot be forgotten. This album, on the other hand, should be.

J.T.

Sound: B Performance: C



**Keeper of the Flame:** Delbert McClinton

**Capricorn CPN-0223**, stereo, \$7.98.

The title says it all. Delbert McClinton from Texas has been playing rockin' rhythm and blues just about forever, picking up the odd hit here and there, like the Emmylou Harris song he wrote and rerecorded for this album, *Two More Bottles of Wine*.

There isn't really anything trail-blazing here. Delbert just does what he does, and does very well. There's a couple old Don Covay songs, *Have Mercy* and *Seesaw*. There's one Delbert's old singing buddy Glen Clark wrote, *I Don't Want to Hear it Anymore*. Randall Bramblett's *Plain Old Makin' Love* and Tim Henson's *Shot from the Saddle* are two more good ones.

The album's limiting factor is that the spontaneity got leached out somewhere in the four or more studios used in recording. The evidence is that the different locations were used to record different sections. The fun, loping feel never quite kicks in to overdrive. Still there's good rockin' tonite on **Keeper of the Flame**. M.T.

Sound: C

Performance: B

**Balance:** Leo Kottke

**Chrysalis CHR 1234**, stereo, \$7.98.

The entertaining if eccentric Leo Kottke is back with yet another album completely unlike the one before it. **Burnt Lips** was resolutely solo and gloomy. **Balance**, made in Nashville, is tight and bright with a lean band on most cuts. It includes producer/drummer Kenny Buttrey and only a bass and a keyboard or two more for a simple, snappy sound.

The songs have been set by Buttrey into rounder settings than Leo's last few records have had, and the result is a pleasant and friendly album. It feels somewhat like Leo's earlier **Ice Water** which included his country near-hit



Leo Kottke

*Pamela Brown*. Indeed, the new album's *Tell Mary* seems poised to at least duplicate *Pamela's* near-success.

The emphasis in **Balance** is on the songs although there are some excellent instrumental pieces, too (six-to-four ratio). The furious bottle-necked *White* and the new working of the old Jefferson Airplane piece *Embryonic*

*Journey* are standout instrumental stuff.

Clean enough sound and unobtrusive production meet the most relaxed Leo Kottke in years, and what develops, **Balance**, is a splendid album. M.T.

Sound: B-

Performance: B+

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**Bop Till You Drop:** Ry Cooder  
Warner Bros. BSK 3358, stereo, \$7.98.

Another review of this album in these pages addresses itself to the technological aspects of Ry Cooder's new album. All I need add to that is that **Bop Till You Drop** is one of the best *sounding* albums I've ever heard at any price.

**Bop** is essentially an R&B album. In the past, Ry Cooder has experimented with a dazzling variety of musical forms, blues to jazz, Mexican to Hawaiian, country to soul and back again. This time out Ryland has crystallized his vision with his most cohesive collection of songs ever.

Most impressive, especially with the digital recording lending unmatched clarity, is Cooder's blending of voices. Along the way he has coaxed some astounding performances from Bobby King who has had his magnificent gospel voice on several Cooder albums. He is at peak form on **Bop**. He even gets to sing the lead vocal on the intense *I Can't Win* which closes the album. On the album's only Cooder original, *Down in Hollywood* written with bassist Tim Drummond, King trades vocals with Cooder and Chaka Khan, each pushing the other ever further. It is an exhilarating song with an extremely effective sound effect in mid-song, a vocal sequence that is a melange of hustling and being hustled on the street. Here the technology particularly enhances the effects.

Chaka Khan also sings duet with Ry on the R&B standard *Don't You Mess Up a Good Thing*, a lively one. Among the others we find Jerry Ragavoy's *Look at Granny Run Run*, a delightful tale of geriatric love and romancing and L-Dopa. *Trouble You Can't Find Me* is a gospel goodie. So is the more funky *The Very Thing That Makes You Rich*, a number that features the largest choir part on the album. The album's sole instrumental is *I Think It's Gonna Work Out Fine*.

Throughout the set the instrumental performances are exemplary, smashing good. The basic band for the album is the drum wizard Jim Keltner, Tim Drummond on bass, and David Lindley on rhythm guitar. Milt Holland, who has added percussion to every Cooder album so far, again works his magic here, but only as needed. Occasionally an extra guitar or an organ part is added. It feels like the musicians and singers, and yes, the technos too, were genuinely excited about making this album, for they have all performed exquisitely and with obvious affection and enthusiasm.

The limits of the technology as it now stands are obvious. Though you

AUDIO • November 1979

can overdub, the basic performance is live. That breakthrough is next. Thus the digital system will work best on music that embraces the live performance, as Ry Cooder's music always has. The interplay and humanity of the music is of the utmost to him.

**Bop Till You Drop** is one of the first of what, without doubt, will be many digital recordings. What comes next certainly will not be up to the quality and class of this first pop release from a major using the new machines.

Don't miss this one. It is for real. And while you're at it, take the advice the album's title gives you. M.T.

Sound: A+ Performance: A

**Somewhere Over the Radio:** Stevens & Grdnic

Takoma TAK-7067, stereo, \$7.98.  
Where has media comedy gone?

Long time passing

Where has media humor gone?

Long time ago

Where have media comics gone?

Out to L.A. every one.

When will they ever learn?

O, when will they ever learn?

Ron Stevens and Joy Grdnic present an album of fake commercials and radio schtick prepared with lots of care to detail. Some is superb — the massage parlor and unisex stereo spots. Fun post-Firesign production for the media overloaded. M.T.

Sound: B+ Performance: B

**The Kids Are Alright** (Soundtrack): The Who

MCA 2-11005, stereo, \$12.98

The movie is a blast — full of clips that go all the way back to the very earliest days and all the way up past the **Who Are You** album sessions. The music is all Who, all apparently live (one or two of the earliest clips may have been lip-synch jobs). That some of it still even exists is a minor miracle — the rumored and never previously shown clip of *A Quick One While He's Away* from The Rolling Stones' "Rock & Roll Circus" TV special.

Some of the material, to put it kindly, is very raw, but so what? The album and film each exist only to preserve the great performances. Nearly anything you'd think is a crucial Who piece is represented.

Of course, since The Who can never be the same again with crazy Keith Moon gone, no matter how well they carry on, it is all that much more precious. M.T.

Sound: C- Performance: A

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**Night Out:** Ellen Foley  
**Epic JE 36052**, stereo, \$7.98.

Ellen Foley is the female voice with Meat Loaf on Mr. Loaf's **Paradise By the Dashboard Light**, a debut with impact.

For her own album, Ian Hunter and Mick Ronson have been brought in to produce. Not very surprisingly, the album's thrust is in a Spectorish/Springsteenish big sound, not unlike Hunter's own stuff with female singing lead. As for the female lead, Ellen Foley has a big voice. She can belt out her rock and roll. What she lacks at this point is the personal stamp to make the performances all her own, more than just being the centerpiece of an elaborate production. It is as if she is borrowing the songs, sings and returns them. Though her voice is packed with emotion, her emotional range is limited. Fortunately for all concerned, the material has been well chosen for her.

Some of what works best are the cover of the Rolling Stones oldie *Stupid Girl*; Graham Parker's *Thunder and Rain*, the only song on the album that Ellen co-wrote, *We Belong to the Night*, and a soft Ian Hunter piece called *Don't Let Go* on which Ellen is given her best shot at not having to belt full tilt.

With the wall of sound production, the album requires high volume just to hear what is in the grooves. Played too soft, some sounds just go unheard.

**Frequency:** Nick Gilder  
**Chrysalis CHR 1219**, stereo, \$7.98.

Despite its stock of well-written tunes and the teasingly androgynous lead vocals, Nick Gilder's third album, **Frequency**, dies a crib death from overproduction. The dense sound of this LP, filled with over-lapping and needlessly juiced-up instrumentals, is saccharine, inflated, and so slick that it renders the songs punchless. The Cars' first LP was undoubtedly the model for Gilder's producer Peter Coleman. Like last year's mercurial success group, Nick & Co. come across as a hard-rock band whose producer has run amuck with synthesizer, guitar, and vocal effects.

The slow numbers, especially, fall flat because the producer's ideas are limited to making raw instrumentals sound voluminous — tempo, song arrangement, and creative mixing are beyond him. The guitars here are invariably recessed and fuzz-toned, the drum placed in commercial (i.e., disco) politesse on top of these respectable little rock tunes swallowed up in the Land of Echo. With a production

Pleasant debut from an artist in quest of her identity. M.T.

Sound: C Performance: C+

**Low Budget:** The Kinks  
**Arista AB 4240**, stereo, \$7.98.

After over 15 years, The Kinks keep coming on stronger than ever. Head Kink Honcho Ray Davies yet again has come up with a kollektion of Kink-songs at least as fine and bracing as any he's konkoked before.

Put simply, **Low Budget** is first-rate Kinks, and that means first-rate stuff on any scale.

The songs have a common thread in the continuing deterioration of modern living. The title song says it best, "I'm a cut-price person in a low-budget world."

Davies, as always, views the world without heroes, without self-deception, without illusion in order to see the illusions of others most clearly. He's got *Attitude*, *Low Budget*, *Misery*, *Pressure*, all of them pointed rockers. *A Gallon of Gas* is a blues. *Catch Me Now*, *I'm Falling* is a thoughtful production number about America's declining impact in the world ("This is Captain America calling"). (*I Wish I Could Fly Like Superman* is a deft catchall of sorts. It's got a hint of disco beat, a strong rock, the timeliness to catch the powerful capetails of a mov-

ie smash and still be a damn good song.

**Low Budget** is the first Kinks album ever to be made in America. But it makes no real difference in their sound. They sound like The Kinks, something nobody else does. The band sounds leaner than ever. They are a four-piece these days with brothers Ray and Dave Davies on guitars and keys, plus as always drummer Mick Avory and recent bassist Jim Rodford, who has departed the band since the recording (but, of course, The Kinks carry on).

The cover design is *real* cheap in keeping with the theme. In fact, the lyric sheet wasn't even sent in the early promotional, DJ, and even store copies. Not due to cost probably, but to the album's rush release. So did they send it out later on to those pres-sies who might need it? Nah, too costly. And why blow a swell low-budget image.

I have yet to meet a rock fan who does not at least like The Kinks. Some prefer certain Kinks albums to others. I know I do. And I'm sure there are lots of quiet souls who don't care for them, because they have never sold big quantities of records. But I've never met a Kinks hater.

So check out **Low Budget**, because when Ray Davies and The Kinks are in good form, ain't nothing more fun. M.T.

Sound: B Performance: A-



scheme hell-bent on a preconceived sound, Nick's band hasn't a chance of speaking for itself. The music is so far removed from the listener amidst layers of technical fiddling that most of **Frequency's** songs are mishmashes or quick burn-outs.

Nick can write and sing well but his tunes need to be more directly presented. Somehow or other his imagination saves the first two songs on the LP from his producer's stranglehold. The chorus of *Time After Time* is a harmonic pun on The Beatles' *You Won't See Me*, with a near-plagiaristic hook in "time after time you say that you don't listen," while the riff-rock *(You Really) Rock Me*, which sounds like Queen with a punk female vocalist, is an interesting combination of heavy, driving instrumental with a pop vocal. Let's hope that rock production style reverts to a more live recording model before all traces of the artist's individuality suffocate from Mixing Board Slick.

Sally Young

Sound: D Performance: C

# Jazz & blues



123

**Saga of the Outlaws:** Charles Tyler  
Nessa n-16, stereo, \$7.98.

Charles Tyler is a grossly neglected reed player whose work has been heard with Albert Ayler and others. Unfortunately he has only recorded a handful of albums in the Seventies, all on his self-produced Akba label. Playing alto exclusively instead of his well-known baritone, Tyler has constructed a fluid and coherent sound picture that he subtitles "A Polyphonic Sonic Tale of the Old West: Ride of the Marauders."

Without using any corny Western themes or effects, Tyler's piece does contain that dramatic tension peculiar to Western movies. The dual bass lines of John Ore and Ronnie Boykins stalk menacingly behind the horns throughout the piece. Drummer Steve Reid adds to the expectancy. His playing improves with every listening. He lays down a steady pulse around which he drops shifting accents.

Tyler's alto and Earl Cross' trumpet expound at length using two different melody lines from which they base their improvisations. Tyler's soloing ability is amazing. He is a fount of re-

generative ideas that spill continuously from his saxophone. He ranges all over the alto, extracting melodies, screams, and whispers from the instrument. After Tyler's long solos, which leave you breathless and hanging at their conclusion, Earl Cross is almost a disappointment. But not quite. He plays in a busy, staccato style that reminds me of Don Cherry.

**Saga of the Outlaws** is the most inspired album I've heard yet this year. It's a rare combination of composition and collective improvisation actually coming together as an organic whole.

This recording was done in '76 and was originally meant to be part of the "Wildflower" series that came out on Douglas. The piece was so perfectly constructed that Michael Cuscuna did not want to edit it down to a size compatible with the "Wildflower" issue. So we have it here in its entirety and excellently recorded. (Nessa records are distributed by Flying Fish, 1304 W. Schubert, Chicago, Ill. 60614.)

*John Diliberto*

Sound: B+

Performance: A+

**Feets Don't Fail Me Now:** Herbie Hancock

Columbia JC 35764, stereo, \$7.98.

The question of whether Herbie Hancock's records since that first *Headhunters* album are jazz has been answered in recent years by the man himself. When Hancock felt the need to tour and record in acoustic contexts with VSOP and Chick Corea, he essentially split the jazz and disco aspects of his musical personality in two. So Hancock's disco records like **Feets** should not be heard in the context of his jazz past, but rather the disco present.

Hancock has crafted an impeccable disc of danceable vinyl. He has honed the music down to its core elements with nary a nod toward the art of improvised solos. The music is the beat. His drums are crisply recorded with a little phase-shifting to accentuate those unvarying rhythms. That standard treble line from the bass supports the drums, and punchy horns demarcate meter into immediately accessible units of dance time. The high pitched, slightly sneering vocals of The Waters exclaim the adult nursery chants of

"Ready or not, when the beat gets hot/Gonna get ya high."

Most disco needs some gimmicky hook, like the suggestive lyrics of "Push push in the bush" or the mocking, costumed homosexuality of The Village People. Hancock's got his Vocoder, a device that sounds like an electronic variation of voice filtering and the talk-box device popularized by Peter Frampton. I assume Hancock wants it for the effect of computerized sexuality and not to give voice to his puerile lyrics.

**Feets Don't Fail Me Now** is perfect, factory-produced disco. It's nice to see that music is like any other commer-



cially marketed industry. Just like Reggie Jackson and Farrah Fawcett, Hancock lends his name to a product to lend it mass appeal and identification. I don't know why he even bothered playing his instruments at the session.

John Diliberto

Sound: A+ Disco Performance: C+

**X-75 Volume 1: Henry Threadgill**  
Arista/Novus AN 3013, stereo, \$7.98.

Henry Threadgill is one-third of the performing ensemble Air. His first solo album is not one-third the music, but a unique and precious recording that will wend its way into the hearts of

**The Development of an American Artist: Dizzy Gillespie**

**Smithsonian R-004**, mono, two discs, \$9.99.

**Afro-Cuban Jazz Moods: Dizzy Gillespie and Machito**

**Pablo 2310-771**, stereo, \$6.98.

**Dizzy's Party: Dizzy Gillespie**

**Pablo 2310-784**, stereo, \$6.98.

**Free Ride: Dizzy Gillespie and Lalo Schifrin**

**Pablo 2310-794**, stereo, \$6.98.

The Smithsonian has another winner with its important two-record anthology of Dizzy Gillespie's music from 1940-46. There is a massive amount of fine material here. This Smithsonian collection, with Dizzy as the focal point, is, in effect, a splendid mini-study of the development of jazz from the late swing era until the advent of bop. The 33 selections span Gillespie's career from his youthful days as a sideman with Cab Calloway to the important Dial recordings when he and Charlie Parker developed the bop style to its full fruition.

Along the way we hear Dizzy in Harlem at the 1941 Monroe's

sessions, playing with musicians like Charlie Christian and Don Byas. A young jazz enthusiast, Jerry Newman, carried a portable disc recorder into various Harlem clubs in the early '40s, and caught this after-hours jam at Monroe's in which an embryonic bop seems about to emerge out of the womb of Up-Town swing. The two Monroe's takes of *Stardust* and *Kerouac* make it apparent that the young Gillespie was already a commanding soloist, although still not the masterful player that Don Byas was at this point.

Gillespie's recordings with the Cab Calloway, Les Hite, and Lucky Millinder big bands serve to spotlight Dizzy's deep roots in swing.

The Millinder band is a revelation on the ferociously swinging *Little John's Special*. This tight, surging piece features an exuberant solo by altoman Tab Smith, followed by a crackling Gillespie chorus that shows incipient bop qualities. Gillespie's expansion of the

Roy Eldridge virtuosic swing style into bop can be examined on the 1944 dates with the Coleman Hawkins' big-band versions of *Woodyn' You* and *Disorder at the Border*. In the very early '40s, Eldridge set the standards for aspiring trumpeters by demonstrating

that sustained legato lines of eighth notes could be performed with power and precision in the higher ranges, and that a talented and technically equipped trumpet man could move easily across the entire range of the instrument. Dizzy mastered the Eldridge technique, then took it a giant leap forward — into bop. Whereas Eldridge would execute dazzling high-octave lines at fast tempos, Dizzy would play these lines in double time and never lose a note. By 1944, Gillespie, along with Parker, was forming the basic bop vocabulary, spewing out a cascading spray of 16th notes that broke up swing's comfortable four-square symmetry, as can be heard on his work in 1944-45-46 with the Hawkins, Oscar Pettiford, Georgie Auld, and Boyd Raeburn big bands. The last group of sides in the Smithsonian double-set, the 1945-46 Guild and Dial small-combo bop classics — *Confirmation*, *Dynamo*, and *Groovin' High*, feature the Gillespie bop style in full cry. His flaring trumpet glissandos are also briefly featured in the exuberantly driving 1944 Billy Eckstine big-band pieces, *Opus X* and *Blowing the Blues Away*. The Smithsonian remastering is remarkably skillful; some of the source material, such as the World War II Eck-

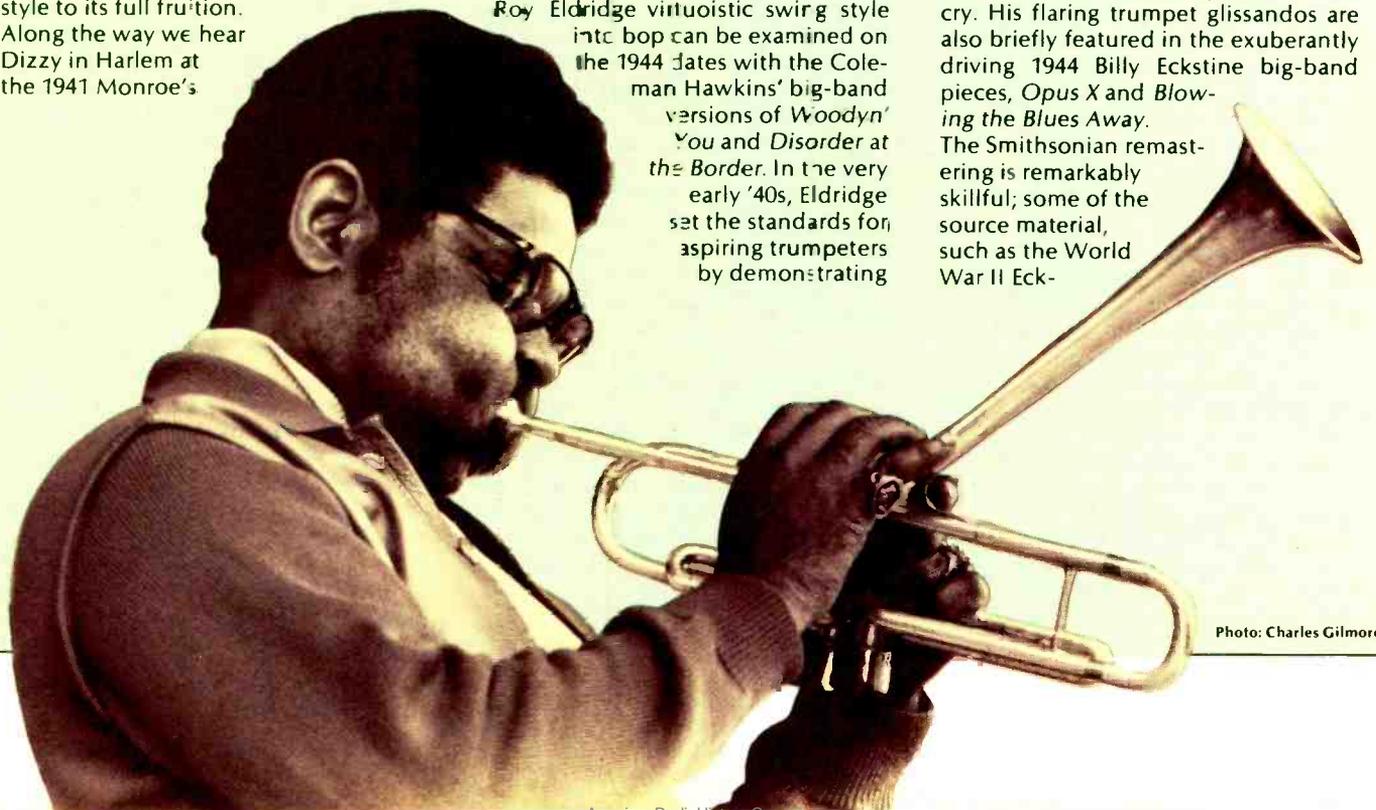


Photo: Charles Gilmore

anyone involved with new music. Except for one tune, X-75 uses a reed quartet of Douglas Ewart, Joseph Jarman, Wallace McMillan, and Threadgill and a bass quartet of Leonard Jones, Brian Smith, Rufus Reid, and Fred Hopkins. This is all anchored by the abstract gospel voice of Amina Claudine Myers.

For this unusual instrumentation, Threadgill has composed some special tunes that are rich in melody, rhythm, and texture. An ostinato bass line dominates *Sir Simpleton* while saxes and piccolo flutter around Myers' questing voice. *Celebration* actually begins as a dirge of droning arco

basses. The switch to pizzicato accelerates the rhythm for a song of quiet triumph rather than excited joy. *Fe Fi Fo Fum* is a boppish number with several strong solos from the reed section. *Air Song*, minus the bass quartet, features flutes and vocals in an ethereal hymn to the wind.

X-75 is one of many beautifully recorded albums on the Novus label. The rich overtones that Threadgill has written into his music are fully reproduced on vinyl. I can't wait for Volume Two. *John Diliberto*

Sound: A- Performance: A

stine shellac 78s, is of very poor quality, but CBS engineers Jack Towers and Arthur Kendy have done wonders. Even if you have some of the material, the Smithsonian set is so well packaged and presented that it becomes an essential collection. (**The Development of an American Artist** is available by mail from Smithsonian Customer Service, P.O. Box 10230, Des Moines, Iowa 50336).

Gillespie's attraction to Afro-Cuban music became apparent around 1947 when he added the great Cuban percussionist, Chano Pozo, to his band and recorded such milestones as *Manteca* and *Cubano Bop*. Since then Dizzy has never lost interest in the fusion of jazz and Afro/Cuban music. The Machito band is no stranger to jazz, having recorded with such artists as Charlie Parker, Howard McGhee, and Flip Phillips; Machito trumpeter/arranger, Mario Bauza, who produced the Gillespie-Machito album, once played in the Cab Calloway brass section alongside Gillespie.

Because of these factors, one would assume the Gillespie-Machito pairing would be a natural, but while there are some fascinating sounds in the grooves of the Pablo album, the overall results are disappointing. Dizzy plays with his usual assurance, enthusiasm, and inventiveness. His improvisations are based on the Cuban melodic themes scored by arranger Chico O'Farrell; O'Farrell uses diatonic and polytonal harmonic systems and serial devices to reinforce these themes, but much of this rather pretentious orchestration seems to impede the driving rhythm that gave Dizzy's original Afro-Cuban fusions and Machito's music their natural excitement. Nevertheless, the playing of the Machito orchestra and Dizzy is outstanding, particularly on side one in *Oro/Incienso/Y Mirra*, where Gillespie gets a chance to display the full range of his virtuosi-

ty against a backdrop of shifting rhythms and harmonic moods. The Dizzy-Machito album was superbly recorded at Generation Studios in New York; the balance between the subtle timbres of the rhythm section and the powerful brass and saxophone sections is perfect.

Very disappointing are the two Pablo albums, **Dizzy's Party** and **Free Ride**. The first appears to be an attempt by Pablo to have Dizzy accommodate to "what's happening." The brief liner notes talk about Dizzy's "first dance album." And indeed, the first cut, *Dizzy's Party*, is an ebullient samba/disco joy ride with Dizzy uncorking some sparkling choruses. The rest of the album, however, is tedious and tasteless. The musicians are surprisingly incompetent — reed-man Ray Pizzi is frequently flat and barely seems able to sustain a note.

There are no album notes on **Free Ride**. Apparently, Pablo couldn't find a jazz writer who would say anything good about the album — even for a fee. Schifrin composed and arranged all the selections and plays an ARP 2600 Synthesizer, a Yamaha Polysynthesizer, Yamaha Electric organ, and ARP Omni Polyphonic Synthesizer. The heavy electronic textures almost blot out Dizzy's impeccable playing; the result is lots of wattage but very little music. *John Lissner*

**American Artist**

Sound: B+ Performance: A+

**Manchito**

Sound: A+ Performance: A-

**Party**

Sound: A+ Performance: B-

**Free Ride**

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# Top of the pile

**Bop Till You Drop:** Ry Cooder  
Warner Bros. BSK 3358, stereo, \$7.98.

The sticker on the jacket proclaims this to be "Rock's First All Digital Recording." Now I'm not sure if Ry Cooder's unique blend of R & B, gospel, Tex-Mex and bottle guitar could be classified as rock, but this is definitely the first digital non-classical release by a major label. The digital machinery used for this recording is 3M's

32-channel system and companion 2/4-channel digital mixdown machine, delivered to Warner and two other L.A. studios earlier this year.

Clean and quiet is the best way to describe this disc. Since Cooder's use of acoustic instruments and quiet vocals does not require much dynamic range, one instead becomes aware of the sharp transients and the utter absence of background noise. Each note appears sharply etched against a dead-quiet background even though nearly all 32 tracks were used on each tune. Credit must also be paid to the excellent pressing which was amazingly made at Warner's normal pressing plants, although extra pains were taken by having the lacquers plated by Sheffield.

All this could be an inkling of times to come for the massed produced disc. Using digital technology, proper recording techniques and existing pressing technology, the "average" pop record could

very shortly be the equal of many of today's so-called "Super Discs" but without their super price.

One final observation; two of the tunes on this album were originally recorded on a 24-track analog machine with noise reduction, then transferred to digital where some additional overdubs were made before mixdown. I wasn't informed which tunes were involved, and I couldn't tell by listening. I think that says something about current analog technology, but I'll let you draw your own conclusions.

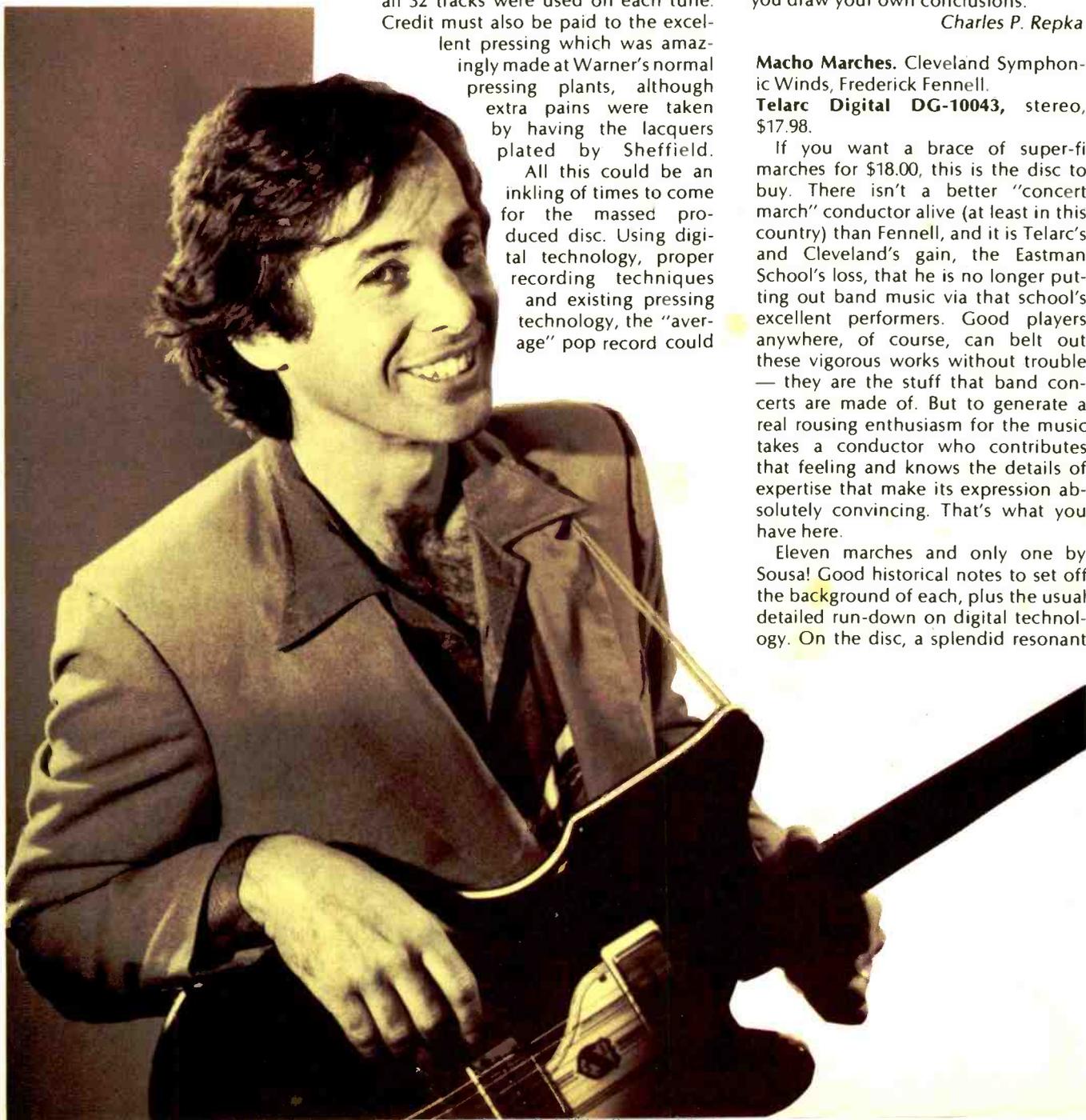
*Charles P. Repka*

**Macho Marches.** Cleveland Symphonic Winds, Frederick Fennell.

Telarc Digital DG-10043, stereo, \$17.98.

If you want a brace of super-fi marches for \$18.00, this is the disc to buy. There isn't a better "concert march" conductor alive (at least in this country) than Fennell, and it is Telarc's and Cleveland's gain, the Eastman School's loss, that he is no longer putting out band music via that school's excellent performers. Good players anywhere, of course, can belt out these vigorous works without trouble — they are the stuff that band concerts are made of. But to generate a real rousing enthusiasm for the music takes a conductor who contributes that feeling and knows the details of expertise that make its expression absolutely convincing. That's what you have here.

Eleven marches and only one by Sousa! Good historical notes to set off the background of each, plus the usual detailed run-down on digital technology. On the disc, a splendid resonant



sound, a vast, thumping bass drum and a brass ensemble as sharp as a razor. Good but not exceptional surfaces. *Edward Tatnall Canby*

Sound: A Recording: A- Surfaces: B+

**Bach: Brandenburg Concertos 1-6**, First Recording of the Original Version with Period Instruments; Concentus Musicus Wien, Nikolaus Harnoncourt, director.

**Telefunken/Barclay-Crocker TEL N 635043**, open reel, \$17.95 (11 Broadway, New York, N.Y. 10004).

Every once and a while a recording is made that is so remarkable that it sounds just as fresh and exciting as when first heard despite the passage of time and "improvements" in recording technology. The Beecham recording of *Scheherazade* fits into this category, as well as Dorati's early stereo recordings for Mercury. So too does this remarkable set of *Brandenburgs* by Concentus Musicus Wien. The recording sessions took place in 1964 through 1966, at a time when some music critics and scholars were saying that difficult music, such as the *Brandenburgs*, could not have been played very well (if at all!) during Bach's time. The old baroque instruments were simply too crude to play in tune or with any great agility. Well, time has found these critics to be far off the mark, with the recordings by the Concentus Musicus becoming the standard by which all other performances on authentic instruments are judged.

The recorded sound also sets remarkable standards for quality even though the recordings took place 15 years ago. Only two mikes were used during the sessions, held in the acoustical (as well as visual) splendor of the Schonburg Palace in Vienna. The use of only two mikes in the proper acoustics insures that all the musical balances were determined by the musicians. No spot mikes were needed — or used. All the balances sound exactly right, with each soloist or group of soloists in their proper perspective with respect to the main group. In Concerto No. 1, for example, the natural (valveless) horns, with their bells facing away from the mikes, appear more distant and have more room sound than the rest of the orchestra, just as they would to a listener in Schonburg.

The recorded sound is remarkably free of tape hiss, a tribute to the German recording team who were among the first to use the 30-ips, wide-track-width technique that was developed to combat tape noise before the intro-

duction of electronic noise-reduction techniques.

Barclay-Crocker's Dolby B N-R transfer is to their usual high standards, and they have managed to fit all six concerti onto a single reel. They have also included Nikolaus Harnoncourt's excellent notes on the works and on the instruments used for the recording. Barclay-Crocker is to be congratulated for adding this classic recording to their open-reel library.

*Charles P. Repka*

**Romance de Amor**. Kazuhito Yamashita, classical guitar.

**RCA Digital RDCE-8**, stereo, \$15.95.

Want to hear an authentic instrumental genius, maybe on the order of a Liszt or Paganini at a very early age? Here you are. I'm no guitarist, but when this 16-year-old (he's now 18) lit into music by the Spanish guitar composer Fernando Sor I almost fell over. *That* a guitar? How any set of fingers —? And when I turned the disc over for one of Benjamin Britten's last and most dissonant works, as of 1964, the *Nocturnal*, Op. 70, I was even more amazed. Dissonance is not easy on the guitar but it's easy for this kid. Fingers of spring steel, an absolutely perfect sense of intonation (tuning), a speed that must be heard to be believed, and with all of this, a very sophisticated and advanced musical sense, with a fine yen for drama and excitement and an exquisite ear for string tone color. As we mostly know, the real genius seems to know everything even before he starts; he learns effortlessly and instantly where others plod for years. That's Yamashita.

D-to-D, of course, and of the best. They took a big risk since the kid hadn't done anything of the sort before and was not yet used to recording. But aside from a very slight feeling of delay between numbers, all goes perfectly, straight through. Interestingly, they taped him first, and used the tape for playback and correction. Good idea.

This series is to my ear right up at the audio top, not merely because of its excellent sound but because of good recording techniques and sure-fire performing. As to surfaces, this one gets a full A — a letter that I very seldom use, you may be sure. It sounds like a digital disc. You hear every tiny incidental noise on the guitar, such as fingers sliding from one position to another, and the very loudest and sharpest notes are twangy as no recording could be without this background of silence. Remarkable.

*Edward Tatnall Canby*

Sound: A Recording: A Surfaces: A

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# Classical reviews



128

**Environments, Disc Eleven.** (SD 66011). (Syntonic Research Inc, 175 Fifth Ave., New York, N.Y. 10010.)

"Most important innovation in sound since Edison's phonograph. May be the most controversial disc ever released by Syntonic." Well, could be, allowing for a bit of exaggeration. For once in my life I'm going to review a record I've never heard — I can't wait. Guess what. This is energy conservation. Both summer and winter. In the cold months, it is claimed to produce remarkable savings in heating fuel. And the same for air conditioning in the hot summer. All, needless to say, by illusion or, if you will, persuasion. Why not? If you *think* you're cold, or warm, you probably are.

The mechanism is simple. On side 1 (for winter) you listen to a gigantic thunderstorm. This storm, it says, supplements the label's Ultimate Thunderstorm on Disc 4. Hmmm. How can you go beyond the Ultimate? Guess you do; because this record, it says, makes you think it is actually raining. OK! I've heard the effect before. And imagine it on my six-channel decode/delay home system. Of course, you do not play this in summer. This would be *de trop*.

On side 2 you are treated, for mid-summer, to an Arctic Blizzard, with wind, sleet, a roaring fireplace, so realistic (it says) that people have shut off their air conditioners in 100-degree heat. Now that IS saving energy.

So buy it and save. It's patriotic. (See address above.) P.S. What's that I hear outside my window? Could it be a genuine thunderstorm? Pardon me, it was only a blizzard.

**The Baroque Trumpet and Organ.** Fred Sautter, tp., Roger Sherman, organ. **Crystal S700**, stereo, \$7.98.

Baroque organ all right. Modern trumpet, with valves. And loud! Those who thrill to the trumpet's sound (Baroque subspecies) will enjoy this man — he is excellent even if the sound is strictly modern. The organ is one of those meticulously built modern "old" organs but in this recording both it and its player, Roger Sherman, seem to me a bit on the lackluster side. The organ's "unequal tuning" (mean tuning?) sounds just plain out of tune at times, though no doubt it is precisely as it should be! (One learns more and more about such things, and it is a fact that our present [equal temperament] tuning would sound distinctly

off to most Baroque ears. It is off, of course.)

Pleasant music, varying from plain dull (Fantini) to vivacious (Viviani and Alcock). The most meaty piece, by Nicholas Bruhns, who interestingly comes from the same region as the later Johannes Brahms, is full of curious breaks and pauses, in the organ fantasy style. Not very persuasively played; the organist's sense of timing and phrasing seem to me un-optimum.

Excellent recording and the very loud trumpet is hardly the fault of the engineer — what could he do? Curiously, it seems occasionally to be at a greater distance. Betcha they did retakes and edited them in. Don't let me carp too much — if you go for Baroque trumpet music, you will like the record.

Sound: B+ Recording: B Surfaces: B

**The 250th Commemoration of Marin Marais.** Oberlin Baroque Ensemble, with James Weaver, August Wenzinger. **Gasparo GS-202**, stereo, (P.O. Box 90574, Nashville, TN 37209.)

A splendid recording of music by Marin Marais from Oberlin, in Ohio, where old music is as well performed

as anywhere in the world, and often better. For the first time I now really appreciate this old Frenchman.

M-M, as I'll call him, can be dull for the modern ear, especially when played in a dull fashion. He was a sort of Telemann of the viol, who wrote quantities of chamber music in the elaborately ornamented style we know best in Couperin or Rameau; but he was neither eccentric nor strongly individualistic, and there are few dramatic "handles" to grab onto. The subtleties of inner styling are what count. Somehow, M-M always seems to go on and on—at length. In my college days I had to listen to entirely too much of him. It was dull listening.

But not here! In spite of a lot of outward sameness, musical feeling shines everywhere through these sensitive and beautifully shaped playings. It takes some adjustment to get used to the unfamiliar sound of Baroque music for viols, but the adjustment will be quick. Through most of side 1 no less than three large-size viols play together, with harpsichord, like three fat tenors. Side 2 goes relatively further afield, adding a Baroque violin (the unretouched form of all our older violins) and a Baroque flute (with finger holes like a recorder), for a gentle tonal contrast. There is indeed a lot of sameness, but these performers never let you down. Marin Marais done to a T. Beautiful recording, too, even if the Gasparo label isn't yet in Schwann.

Sound: B+ Recording: A- Surfaces: B+

**Handel: Acis and Galatea.** Gomez, Tear, Angridge, Luxon, Academy of St. Martin-in-the-Fields, Marriner. **Argo ZRG 886-7**, 2 discs, stereo, \$17.96.

There have been so many wonderful records out of England on the Argo label! And such wonderful things from St. Martin-in-the-Fields and Neville Marriner — his Beethoven Fourth Symphony, for instance, on Philips. For my ear, this Handel is outrageously bad. It hurts.

How? In the 19th century, we remember, Handelian choruses grew to giant size, as in *Messiah*, and Handel's lovely pastoral music often got so icky it practically melted. And yet, even under Sir Thomas Beecham, it carried conviction, it was real. Now — the reaction. Here is a vital and splendid early Handel work, ever so pastoral in nature, full of dulcet solos and lovely chorus music. What do we have? Bellowing, steely-loud opera-type solo voices recorded close and overpoweringly loud (though some of

them sing very well). And the chorus music? It isn't even sung by a chorus, but by a group of even more famous solo voices, also recorded blisteringly loud and close. I found it absolutely awful, even though some of these soloists are superb in their own right in other places than here. *Pastoral?* About as gently pastoral as a steel mill in full blast. I turned it off in disgust halfway through side 1. I love this music. Do we have to turn everything into jet-age international opera?

Sound: B Recording: C- Surfaces: B+

**Max Bruch: Eight Pieces for Clarinet, Viola and Piano, Op. 83.** The Empire Trio. **Crystal S643**, stereo, \$7.98.

**Max Bruch: Concerto for Two Pianos and Orch.; Fantasy for Two Pianos; Swedish Dances for Piano Four Hands.** Martin Berkofsky, David Hagan; Berlin Symphony Orch., Herbig. **Vox Turnabout TV 34732**, stereo, \$4.98.

Just as well that Crystal's Max Bruch recording, the first above, turned up in time to review with Turnabout's for two pianists. I felt uneasy about the latter and still do. It is a recording full of tensions and they do not concern Max Bruch himself at all.

The clarinet/viola pieces are modest, conservative works of old age, composed by this Brahmsian German in 1909 at age 70 and sounding remarkably like a gentler Brahms of, say, 1870. Conservative, but very musical and lovely to hear. After all, we can't all be genius innovators, whether in audio engineering or musical composition. I liked the eight pieces, which in a brasher, younger composer would surely have been proclaimed as a pair of sonatas, each in four movements — they fall into place neatly on each side of the record, one sonata per side. The clarinet is nice, the viola a bit on the hoarse side (one of the recognized styles of viola playing) but good, and the piano excellent, all three players working modestly and musically together for a persuasive effect. A good record of worthwhile minor music.

As for the big two-piano concerto, the two American pianists who have resurrected it from a dismally checkered past — it was appropriated and falsified by two enterprising pianist sisters — deserve kudos for their scholarship but not for their piano style. These are the bang-bang American type of pianist, physically mild looking, with round, amiable faces and close, long hair, near-double chins, their whole being concentrated in

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their all-potent hands on the keyboard. No complaints about sheer finger technique — they have it. But to subject poor Max Bruch, a gentle man by all accounts, to such a battering of powerhouse playing seems to me to be unfortunate, if not outrageous. It just is NOT that kind of music and these guys should know better.

You can hear the conflict right in the recording. The Berlin Orchestra, good German players, seem almost audibly to cringe every time the powerhouse pianos move in: they are demoralized, they hang back, they play sloppily. One senses a lack of any enthusiasm — the performance reeks of it! So I read the message. Not conducive to good music-making. The two Americans are better on their own, minus competition, and the Swedish Dances are enjoyable. All this music virtually unheard in recent times.

I could be wrong; the pianos could have been hard-toned, the mikes set up too close, and so on. I doubt it. These things do not obscure basic musical characteristics. Max Bruch deserves a better fate.

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Sound: B+, B  
Recording: B+, B Surfaces: A-, B+

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**New England Contra Dance Music.** Alan Block, Strathspey, George Wilson, Arm & Hammer String Band. **Kicking Mule KM 216**, \$7.98

Wonderful how traditions go on & on. A generation ago I got to know (and even to dance) some of the music on this disc, in my folkdance days, and along with the music I made friends with some of the best of the then-active folk purveyors, long before "folk music" hit the charts in the 1960s. A pleasure, now, to hear things still alive and kicking (like a mule), as per this disc. These are mostly young people, a very new generation. But the old ways do go on, mostly.

Two groups (with the now-popular trick names) and two individual fiddlers, who play solos. All the music is, of course, for dancing, and that poses the usual problem on records. How much is too much? More important, how much is too little? By itself, the music tends to be, quite naturally, very repetitive. The variety comes in the dance, not the music. Sometimes, in the long dances, the music goes on and on until everybody drops; can't do that on records. But a too-short sampling loses the whole flavor.

I like what they've done here. Long enough to get the feel, never too long for listening. Just right, I'd say. Out of

past experience, I have positive ideas about the performers, too. The two solo fiddlers are excellent, both. The Arm & Hammer people are terrific. As for Strathspey, I found them a bit earnest and not too adept, rather off tradition. Their harmonies are gauche and ever so slightly tinged with the clumsier side of rock. OK, but they left me uncomfortable. An unsure ear for the modal scales, too. Not well used. Even so — the record jogs and bounces and tilts along throughout and you'll enjoy it, sitting down.

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Sound: B- Recording: B Surfaces: B

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**G. F. Handel: Messiah.** With Elly Ameling, soprano; Anna Reynolds, contralto; Phillip Langridge, tenor, and Gwynne Howell, bass. The Academy and Chorus of St. Martin-in-the-Fields, Neville Marriner, cond.

**ARGO/Barclay-Crocker ARG V 18D3**, two reels, \$25.95.

Perhaps one of the most difficult tasks facing a recording team is when they set out to capture a major opera or oratorio on tape. The human voice, whether singly or in groups as a chorus, is a very elusive beast and not easily found in its natural state. This is due, in part, to its wide dynamic range, its harmonic structure, and the fact that Mother Nature, in her infinite wisdom, has made our ears to be the most sensitive in the frequency range to those tones covered by the normal voice. Any distortion or coloration is quickly detected.

The recording team for ARGO, however, seems to have the problem well in hand, as this new recording of Handel's *Messiah* will attest. This is the finest recording of this popular work I've heard to date. The balances between the orchestral and vocal forces are, in a word, superb. The excellent soloists have just the right combination of presence and ambience. The chorus of men and boys *sounds* like a chorus, not like a group of individuals as is so often the case.

For this recording, conductor Neville Marriner has chosen to use the new Christofer Hogwood edition, which recreates as nearly as possible the first London performance of the work in 1743. After that first performance, the many changes made by Handel to accommodate the abilities of subsequent performers, along with the many changes incorporated by succeeding generations of musicians, has led to the version we know today. Mr. Hogwood's changes (described in great detail in the booklet included

with the tapes) are sometimes subtle, with only a bar or two being modified, and at other times very obvious, with completely unfamiliar melodies and/or meter. This recording also includes many sections that are not usually performed in concert or included in other recorded performances. If you are familiar with the more traditional versions of *Messiah*, this ARGO recording will hold many new delights.

Barclay-Crocker has done more than their usual excellent job of duplication. The sonic qualities of these tapes are far superior than any discs could be with a work of this sort. The limitations of the disc process, especially at inner grooves, are such that no disc could ever match these fine tapes. If you are somewhat skeptical of my statements, listen to the final Amen chorus on any disc version of *Messiah* (including the disc version of this ARGO recording), and then to the Barclay-Crocker tape. The complex waveforms generated by the sound of the full chorus, orchestra, D trumpets, and tympani simply cannot be reproduced in inner disc grooves by any current cutting or playback equipment. Open-reel tape is the clear winner here.

(Available from Barclay-Crocker Tapes, 11 Broadway, New York, N.Y. 10004.)  
Charles P. Repka

**Bruckner: Symphonies Nos. 5, 7, 9.** Gewandhaus Orchestra of Leipzig, Masur. **Vanguard VSD 71239/40, 71242, 71245**, stereo, \$7.98 per disc.

Curious—though Bruckner is not my favorite composer and often drives me wild with his wandering repetitious harmonies and circular compositions (!) (them's fighting words, I know . . .) I still can tell quite easily when the old man is being well performed.

He *is* well performed, decidedly, in this notable series from Leipzig, and this is confirmed for me by a Bruckner enthusiast who put me through hours and hours of these discs for his own pleasure. They are absolutely first-rate. If you want Bruckner, here he is. These, incidentally, are all in the original or restored versions—not that most of us will notice the difference. There is also a Symphony No. 4, and presumably all of them will soon be available. You won't do better anywhere.

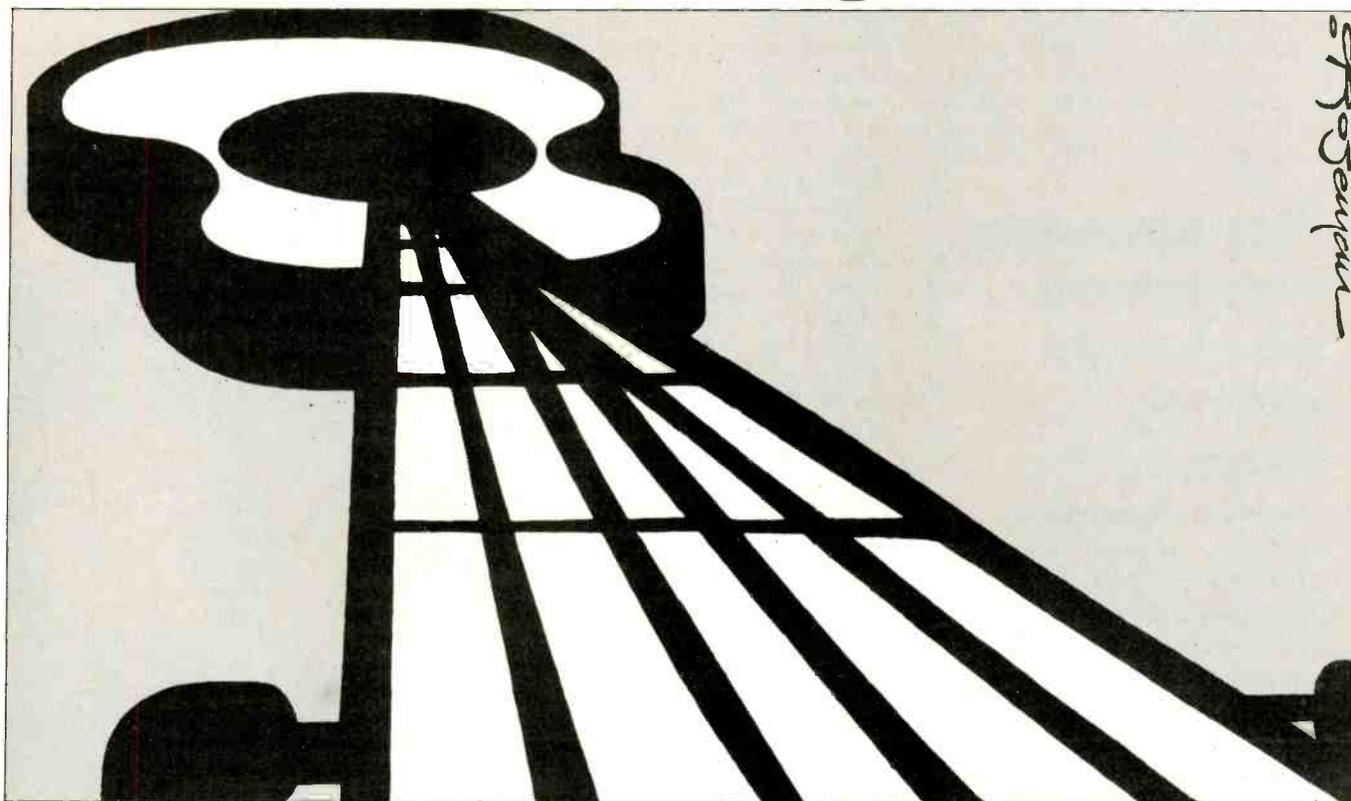
Rather distant stereo recording, evidently minus any sort of accent miking and probably via one of the central-point stereo pickups. It's good but a bit lacking (from our viewpoint) in sharpness and definition; this is a matter of taste. You'll adjust in minutes.

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Sound: B Recording: B Surfaces: B+

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# Folk bag



**Fiddle Tunes:** Frank Ferrel  
**Voyager VRLP 320-S**, stereo, \$6.98.

Frank Ferrel is an unknown name to me, but I suspect he won't remain unknown for long.

The Seattle fiddler's personal roots seem to be in the Pacific Northwest, yet his musical influences and repertoire come primarily from eastern Canada. Like Jean Carignan, Ferrel combines features of both French and Anglo-Irish Canadian fiddling into a cohesive, highly mature style. Ferrel is considerably less intense than Carignan but, as his performances of *Tarbolton Lodge* and the set opening with *The Plumed Hat Reel* illustrate, he can be every bit as exciting.

Not only does Ferrel have a seemingly boundless source of energy which keeps his reels and jigs driving straight-ahead without a letup, his playing is abundantly ornamented with a variety of triplets, graces, rolls, and multi-stops. There are some minor flaws in intonation, but only the pickiest of listeners should find them bothersome.

Fans of Canadian fiddling will rec-

ognize many of the tunes as old favorites (for example, *The Joyous Waltz* and *La Bastringue*). There are also some fine lesser-known tunes, such as *The Bee's Wing Hornpipe* and Ferrel's own *Mt. Rainier Reel*. The only sub-par track is *The Kid on the Mountain*; no matter what Ferrel claims in the notes, he *still* doesn't understand it!

The piano accompaniment—by, of all people, Canada's most popular fiddler, Graham Townsend—is powerful and varied. I only wish it had been mixed down somewhat. Regardless of how famous the accompanist is, he should *never* come this close to drowning out the fiddler! The surface is somewhat static-ridden. (Voyager Recordings, 424-35th Ave., Seattle, Wash. 98122.)  
*Tom Bingham*

Sound: B-

Performance: A-

**Back to the Wall:** Peter Lang  
**Waterhouse 7**, stereo, \$7.98.

After three albums of tricky-flashy acoustic guitar compositions in the John Fahey/Leo Kottke "contemporary guitar" vein, Peter Lang is taking a turn

for the outrageous. On **Back to the Wall**, he expands his rural-blues-rooted vocal/instrumental mix to include strange little experiments with a guitar-synthesizer, as well as blowsy ensemble arrangements complete with horn and rhythm sections and backup singers.

Lang's nimble slide-guitar workouts (hear *Guitar Rag*—a close relative of Leon McAuliffe's *Steel Guitar Rag*—and *Living in the Weeds*) are as penetrating as they are dexterous. His *Country Blues Medley* is a witty concoction of electric finger-picking, bubbling buzz-toned synthesizer, and dixie-tinged horns (though I've never exactly considered the southern African *Guabi Guabi* a country blues tune!). Even the old-time country rag *Colored Aristocracy* and the well-known hymn *This World Is Not My Home* are not immune from Lang's electronic exploration.

Lang transforms Cat Iron's *Jimmy Bell* into a hard-stomping blues-rock romp, spiked with country-jazz steel licks courtesy of Jeff Dayton. By contrast, *My Dear Mary Anne* is a charm-

ing south-of-the-border original with sweet, multi-stopped fiddling by Jim Price. The closing *Farewell Maximilian* has an unusual and very poignant melody, sensitively arranged.

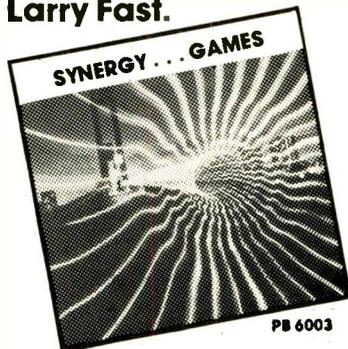
As impressive as it all is, one is left with the impression that this is not yet a finished statement, just a step in what is turning out to be a highly individualistic artistic evolution. One can only wonder what bizarre ideas Lang has up his sleeve for his next album!

The guitar sound is very emphatic and upfront. The ensemble, though, would have benefitted from a much more pronounced stereo spread.

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(Waterhouse Records, 807 Hennepin Ave., Minneapolis, Minn. 55403.)

Tom Bingham

Sound: B- Performance: A

**Live in L.A.:** Scotty Stoneman with The Kentucky Colonels

**Briar 4206**, mono, \$7.98.

An amazing album. Scotty Stoneman was and is a devilish and absolutely confounding fiddler. This album contains a live set, recorded with the equally amazing and legendary Kentucky Colonels, which featured the guitar genius of the late Clarence White. It dates from 1965.

Peter Rowan and Richard Greene agree in their transcribed conversation that serves as liner notes that these mono club tapes are the best representations of Scotty Stoneman's huge fiddling and singing talents with a genuinely great band backing him. Shortly after, Scotty gradually lost his edge to a long illness.

In any case, the album displays brilliant talent in its home element and playing for all it is worth, especially on instrumentals like *The Eighth of January* and *Sally Goodin*. The recorded sound is surprisingly good despite the album's disclaimer. The spontaneity of the club atmosphere is delightful.

Scotty and Clarence are gone, both of them. But this album is as vital as when the tapes went down. Top-notch bluegrass music. (Briar Records, P.O. Box 5853, Pasadena, Cal. 91107.)

Michael Tearson

Sound: B Performance: A

**The Lifeguard:** Marshall Family **Rebel SLP-1567**, stereo, \$7.98.

The Marshall Family takes a low-key folk-country approach to newgrass-gospel. Their introspective progressive style features soft-focused, beautifully harmonized quartet singing over supple acoustic-string backing, often spotlighting tight, unadorned mandolin by Dan Marshall.

But the most striking aspect of the group's style is Judy Marshall's lead singing. Her tremulous voice is light, almost frail, yet her captivating Dolly Parton quaver is touchingly emotional and undeniably sincere. If she ever decides to move into the secular field, she might well provide stiff competition for Emmylou Harris.

The material, much of it written by banjoist, lead guitarist and alternate lead singer Dave Marshall, is effective for the most part. However, the group's adaptation of Olivia Newton-John's *If You Love Me, Let Me Know*

to a gospel lyric seems not only an unnecessary affectation, it's musically out of place as well. Their lined-out a cappella setting of *Amazing Grace* is lifted directly from Ralph Stanley, but if you're going to borrow, you may as well borrow from the best! (Rebel Recording Co., Inc., Asbury, West Va. 24916.)

Tom Bingham

Sound: B Performance: A

**Step It Up And Go:** John Jackson **Rounder 2019**, stereo, \$7.98.

John Jackson is a wonderful man, warm and personable. And a delightful and superb blues singer, although I suspect that he would not be very



happy at being pigeon-holed as such. His tastes are open and varied, embracing lots of blues, of course, and lots of country music, too, from Uncle Dave Macon through Hank Williams. If the song moves him he likes it. Doesn't worry about what kind of song it is, only if it's a good one.

This collection is mostly blues, good-timey stuff. He plays guitar (excellently) throughout except for one number where he plays banjo. The ease of the man's performances, his naturalness, is what permeates the album.

In the liner notes it is said that John no longer plays with the fever and demons of a young man. And it is true. But after all, how old did Robert Johnson live to be? John Jackson plays his music with the grace and joy of a man at home in his world. And that is rare.

Michael Tearson

Sound: B Performance: B+

# Theater music



**Sweeney Todd:** Original Broadway Cast Recording

**RCA CBL2-3379**, 2 discs, stereo, \$15.98.

Subtitled "A Musical Thriller," Stephen Sondheim's new Broadway Tony-collector stars Angela Lansbury and Len Cariou and marks the Harold Prince/Stephen Sondheim/Hugh Wheeler team's entry into *grand guignol*. The story of the "demon barber of Fleet Street" is a horrifying bit of 19th-century British melodrama, stuff quite beneath the talents of someone like Sondheim. This score, virtually without a traditional song or aria and the closest the composer has come to opera, is astonishingly brilliant in its inventiveness, but it's a lot more pleasant to study the two-record set than it is to cope with the production, which is all blood and gore. With the album and enclosed libretto you can smile at *The Worst Pies in London* and *A Little Priest* without remembering that in the story the barber slits the throats of his

customers and his mate grinds them up into meat pies for sale. Not exactly Radio City Music Hall stuff. Sondheim's love songs (*Green Finch and Linnet Bird*, *Johanna*, and *Kiss Me*) are stylized (I don't think he believes in them or those characters one bit), and the real energy — I'm almost tempted to say a daimonic energy — is reserved for the ugly/comic numbers.

Angela Lansbury and Len Cariou have voices which nicely complement each other; her whiny Cockney, all fluttery and lippy, almost spits back at his dark and undulating and warning baritone. This is not the sort of Broadway show you hum to. It's something to be studied, if you can distance yourself from the ugliness of its conception and the unrelieved and rather facile gloominess of its misanthropy. Musically brilliant, but in a way which runs counter to its nastiness, **Sweeney Todd** will not be to everyone's taste. But Sondheim, always reaching for a

new style and tone, must be taken seriously. RCA, unfortunately, has been having trouble with lots of release sets (side four is the villain), so be careful. For the rest, the stereo separation is often artificial, and the rich orchestrations, by Jonathan Tunick, are sometimes drowned by a certain bass muddiness.

**Manhattan:** Music from the Woody Allen Film

**Columbia Masterworks JS-37020**, stereo, \$7.95.

Whatever you thought of Woody Allen's "Manhattan," you have to come up with a different set of adjectives than you'd use to describe George Gershwin's music, either his famous *Rhapsody in Blue* or the songs. Woody Allen was sharp in selecting Gershwin's music for his bittersweet tale of modern Manhattan manias, and this fine album can be enjoyed quite independent of the film. Side one is a

complete version of *Rhapsody in Blue*, with the Ferde Grofé' orchestrations, under Zubin Mehta's baton, and with the New York Philharmonic and Gary Graffman at the piano. It's probably the best recording of this old chestnut since a very early Andre Kostelanetz version. Side two is given over to complete and incomplete medleys of wonderfully arranged (by Tom Pierson) songs—*Someone to Watch Over Me*, *I've Got a Crush on You*, *Do Do Do*, *He Loves She Loves*, *'S Wonderful*, *Embraceable You*, *Love is Sweeping the Country*. What is especially admirable about the playing and recording and mixing is that nothing is belabored, the subtleties in Gershwin's own melodic lines are allowed enough time but never protracted, and Columbia's

technical team was clearly enjoying every minute of the job. The disc concludes with a restrained, mature reading of *But Not For Me* ("They're playing songs of love, but not for me..."). It might be quintessential Woody Allen, but it was quintessential Gershwin first. It added greatly to the affecting tone of the film's finest moments, and somehow it's even better here, where you can supply your own images. A lovely record, an honest homage for a change!

**Hurricane:** Original Motion Picture Soundtrack by Nina Rota  
**Elektra 5E-504**, stereo, \$8.98.

Nino Rota's score for "Hurricane" is an orchestral suite linked by a major theme which also draws on Dixieland

jazz and Hawaiian steel guitar music to underline the story of lovers caught in a (literal) storm in the Samoa of 1920. It was the last complete film score composed by Rota, who died in Rome just as the Dino de Laurentiis production was opening in the United States.

Famous for his great scores for Fellini, Zeffirelli and Visconti, among others, Nino Rota was also a major contemporary classical composer. But he didn't let on in this thin score. It has the sound of having been composed in a hurry, or as a throw-away — it's terribly pretty (and largely reminiscent of the most haunting moments from his score for "Godfather II," for which he won an Oscar), but it's also very repetitive in that prettiness. The lovers' theme dominates when the beat-beat-beat of the tomtoms doesn't. This is one of Elektra's cleanest albums, sharply produced by young Roger Mayer, the London sound engineer.

**Voices:** Selections from the Motion Picture Soundtrack, songs and score by Jimmy Webb and others  
**Planet P-9002**, stereo, \$7.98.

You have to be a Harvard lawyer to figure out the complicated credits listed for the various songs and lyrics on this soundtrack album. I gave up after 15 minutes. But the music has a certain catholic charm, and that means it offers something to virtually every musical taste (and can be appreciated whether you've seen the film or not, which is a major marketing consideration). The theme song, *I Will Always Wait for You*, is the old Hollywood, even though it's sung by the modish Burton Cummings. There are the requisite disco numbers, a charmingly and disarmingly simple variation on the early Simon and Garfunkel called *The Children's Song* (performed by David and Andy Williams), and the fillers, which are banal beyond belief. "Voices" was a recent failure at the box office, and the album will probably not sell a million. But I think it reveals something important about the presumptions of soundtrack composition today: We're back to the required theme song (a vocal), the presence of sentimental, carefully modulated filler music, a few timely beats (in today's case, disco), some pop hits by other performers of recent years (which makes for instant nostalgia), and reprises to provide gap-space. Not exactly heartening, this line-up — creativity gives way to formula, and the commercial consideration predominates. The disc I received was badly warped, so if this is your sort of thing, check the quality first.



**Alien:** Original Motion Picture Soundtrack Score by Jerry Goldsmith  
**20th Century-Fox T-593**, stereo, \$7.98.

It's hard to imagine this album being sought after (or enjoyed) by any but the most hardened soundtrack aficionados. Composer Jerry Goldsmith (who also composed the scores for, among others, "Magic," "Patton," "The Sand Pebbles," "The Omen," "Planet of the Apes," "The Boys from Brazil," and "A Patch of Blue") has dashed off formula stuff for this sci-fi horror thriller about a human-devouring organism onboard a spaceship. The main- and end-title music has the

kind of languorous sweep associated with lush Hollywood scores, but in between it's all electronic effects, snare drums, eerie horns and heart-pounding tempos that do not evoke emotions so much as pummel them. Here and there (in *Acid Test*, for example, or in *The Alien Planet*) there are measures that are redolent of Goldsmith's debt to Charles Ives and Anton Bruckner: The atonality and musical montage rise to some inherent purpose. But the rest is sheer schlock, suited to the film it accompanied. Fox's record is crisp, and underplays the echo effects.

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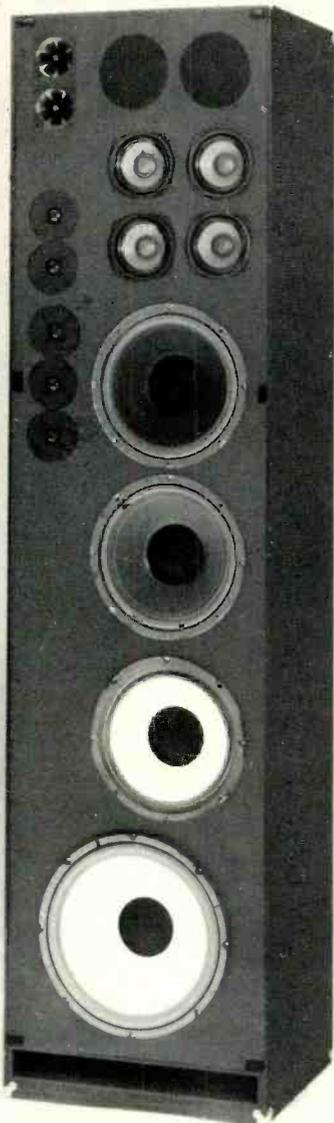
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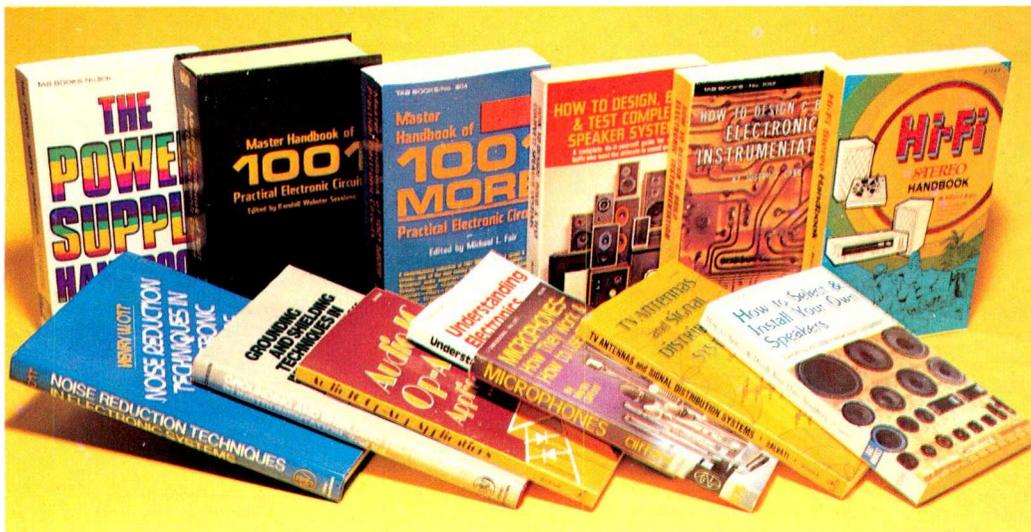
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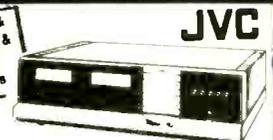
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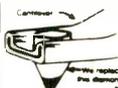
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New findings based on channel phase differences have been added to our cartridge reviews which include: NAGATRON 360 CEX, SUPEX SD-901 (high output), ACUTEX M320/III, SHURE V-15 IVG (spherical) and Type III, ADC ZLM, SIGNET TK7E, SONUS BLUE, PICKERING XSV-3000, STANTON 881S. Preamps include APT/HOLMAN, SERIES 20 C-21, JSH LABS MODEL T SPECTRO ACOUSTICS 217, MARCOF PPA-1, EPOCH IOU-4000, ADI modified PARAGON E1. We look at following turntables & tonearms: B&O 4004 & 3400, SME III, DENON DP-790, MITCHELL FOCUS ONE. SOUND AIDS TONEARM MOD Loudspeakers cover the field with the (NEW) DCM TIME WINDOWS, ROGERS COMPACT MONITORS, LIVE PERFORMANCE MODEL ONE, GRAPHYX SP6, BASSMINT 10/24, MONITOR AUDIO MA4, EPICURE-14, RTR 800D and the FRIED H/2 & T. Also, the HAN-D-MAG, GRT Products, QUIETONE, STATIBRUSH and SPECTRA MAT. We review over 30 recommended records (half on budget labels), tell which speakers break the laws of physics and acoustics, look at loudspeakers and "real world" power rating, phono capacitance loading and wet record play considerations—plus much more—PLEASE JOIN US \$12 (4 issues), \$14 1st class mail & Canada, \$17 Foreign air mail—VERY SENSIBLE.

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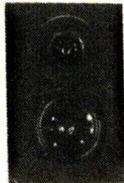
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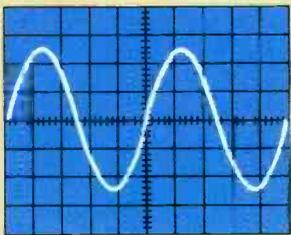
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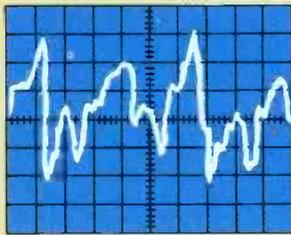
# Many amps can deliver pure sound. The Sansui AU-919 delivers pure music.



Today's audio engineering has reached the point where you can select among a number of affordable high-power amplifiers that have virtually no "total harmonic distortion." That's good. But THD measurements only indicate an amplifier's response to a pure, continuously repeating, steady-state test signal (below, left). They don't tell you how the amp responds to the never-repeating, rapidly-changing transient waveforms of real music (below, right). And only an amplifier designed to reproduce the demanding dynamics of music signals can satisfy the critical audiophile. An amp like the Sansui AU-919.



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The Sansui AU-919 sounds better than conventional amps because Sansui developed a unique (patent pending) circuit that is capable of achieving both low THD and low TIM simultaneously.

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Since ultimate tonal quality depends on more than the power amplifier alone, Sansui also uses its DD/DC\* circuitry in the phono equalizer section — where current demands are also particularly high — to prevent TIM. ICL (input capacitorless) FET circuits are used throughout the AU-919, and a "jump switch" is provided that will let you run pure DC from the Aux. input to the output.

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\*The Diamond Differential/DC, Sansui's (patent pending) totally symmetrical double ended circuitry with eight transistors, is named for its Diamond-shaped schematic representation.

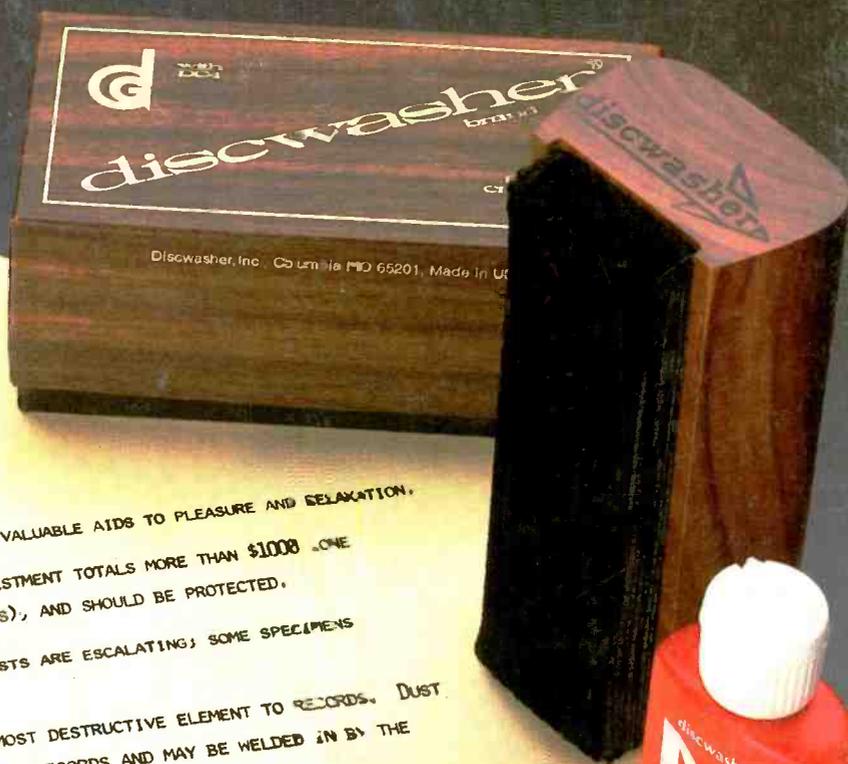
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