

The  
Authoritative  
Magazine  
About  
High Fidelity

# Audio

DECEMBER 1981  
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**PIONEER'S  
HOT A-9 AMP!**

**CANBY  
ON THE  
WALKMAN**

**INTERVIEW:  
MORTON  
GOULD**

**HANS  
FANTEL:  
A GIFT  
OF MUSIC,  
LONG AGO**



# A WHOLE NEW TOP OF ALL THESE FEATURES.

have won Pioneer acclaim throughout the high fidelity industry.

Pioneer's engineers have designed an exclusive ID MOS FET transistor for the front end of the SX-7's tuner. It allows you to tune in stations with weaker signals without worrying about stronger stations causing distortion due to front end overload. That's what keeps the SX-7 virtually free of RF intermodulation.

But no matter how free a receiver is from all forms of distortion, it must be able to keep the station you select perfectly tuned for hours. Pioneer's quartz-PLL digital synthesized tuning does this by making drift virtually impossible.

Pioneer's exclusive  
Non-switching™ amp

also eliminates distortion caused by output transistors switching on and off thousands of times a second in response to music signals. This is one of the reasons that the total harmonic distortion of the SX-7 is no more than 0.009% (continuous average power output of 60 watts per channel minimum at 8 ohms, from 20Hz to 20,000Hz).

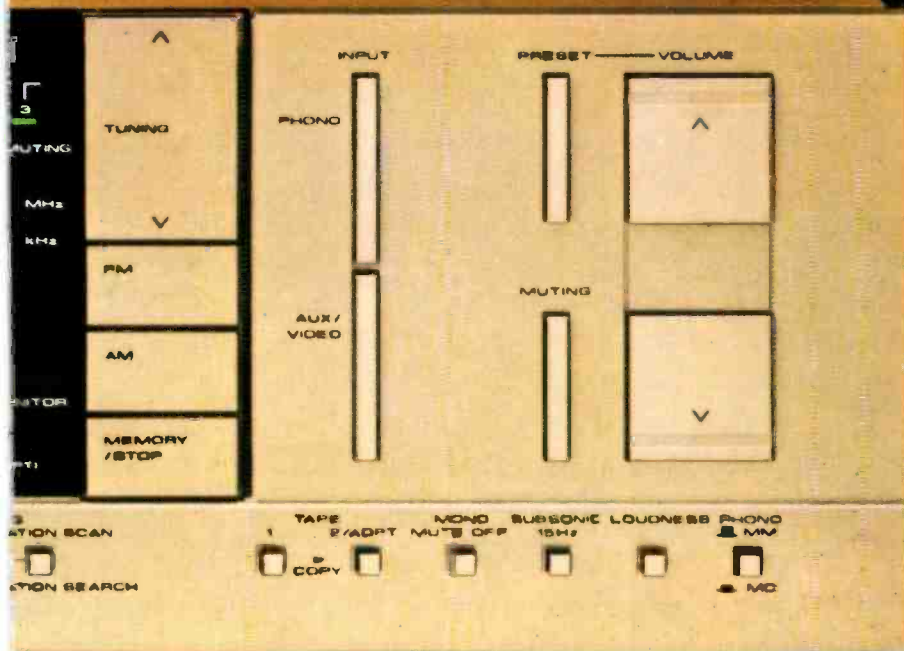
And Pioneer's high-gain phono preamp section allows the use of either MM or low-output MC cartridges selectable by a front panel switch. There's even a Subsonic filter you can use to do away with very low frequency interference caused by record warps.

Now, if you think all these features sound great in print, listen to them in person at your nearby Pioneer dealer. He'll demonstrate the SX-7 and an entire new line of Pioneer receivers. And you'll quickly see that we've done everything humanly possible to give you more music for your money.

That's what made Pioneer No. 1 in receivers. And that's what's going to keep us there.

## SX-7 RECEIVER.

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



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# AND ONLY PIONEER OFFERS A ENGINEERING CONCEPT ON T

You'd expect a new receiver from the leading manufacturer of stereo receivers to be packed with exciting features. As you can see, it is. But Pioneer didn't get to be No. 1 in receivers by doing the expected and stopping.

So we developed the SX-7 using a unique engineering concept we call High Fidelity for Humans. It makes the SX-7 as superb to live with as it is to listen to.

At the heart of the receiver is a microcomputer that's been programmed to operate controls electronically. It affords the owner of the SX-7 operating convenience unlike any previously available in conventional receiver designs.

For example, the microcomputer's prodigious memory allows you to preset up to eight FM and eight AM stations and recall them instantly. Once set, all stations are

directly accessible via "Station Call" buttons. And you can even recall them at the preprogrammed volume level because the microcomputer electronically controls volume setting.

What's more, with just the touch of a button you can search out the next station up (or down) the AM or FM tuning band. Stations are brought in perfectly tuned every time. And you can select any station by tuning it manually or scanning the entire band automatically sampling five seconds of each station.

But these human engineering features aren't all that make the SX-7 such an extraordinary receiver. It also offers features that

## INTRODUCING THE PIONEER



**NO OTHER  
RECEIVER  
OFFERS  
ALL THESE  
FEATURES.**

## Computerized Push Button Controls:

Pioneer has programmed a microcomputer to operate con-



trols electronically for improved accuracy, reliability and convenience.

## Quartz PLL Digital Synthesized Tuning:

FM "Drift" is eliminated by this incredibly accurate tuner.

## Station Scan:



Touch this control and you'll hear five seconds of every station strong enough to meet the mute threshold.

## Station Search:

Touch this control and move to the next station up, or down, the band.

## Subsonic Filter:

This control lets you do away with ultra low frequency distortion caused by record warps and such.

## Volume Memory:

The SX-7 will also remember the volume you select for each preset station.

## Eight AM presets, eight FM presets:

The SX-7 will memorize eight of your favorite FM and eight of your favorite AM stations and retrieve them instantly.



## Non-Switching Amp:

Pioneer's patented amp design gets rid of transistor switching distortion once and for all.

## High-Gain Phono Preamp:

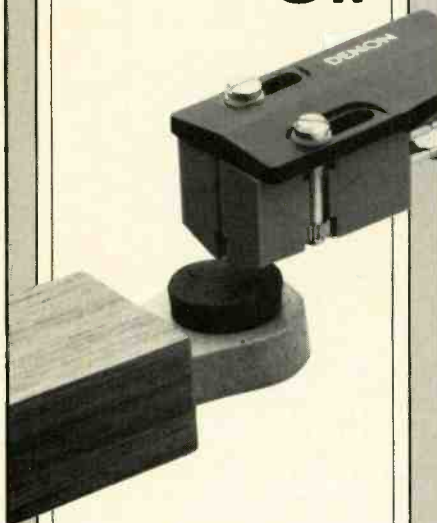
Allows the use of either MM or low-output MC cartridges.

## ID MOS FET Front End:



This exclusive transistor circuitry tunes in weak stations as clearly and quickly as strong stations.

## Give Record Abrasion the Brush Off



Brush away stylus contamination with the SC-2™ Stylus Care System. Two drops of SC-2 fluid on the special nylon fiber brush effectively loosens and wipes away harmful coatings.

Protect your stereo system and maintain its sound with the SC-2 Stylus Care System.

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# DESIGNED FOR ACCURACY

The unique design of the head assembly for the Reference

Series Model 105.2 and Model 105.4 is just one example of KEF's world-renowned research and engineering.

Each unit is housed in its own

enclosure of selected dimensions to support optimum radiation over the operating frequency range, and is scientifically shaped to avoid unwanted secondary wave formation.

The outstanding acclaim for the Model 105.2 created a demand for a system of similar performance and accuracy from a smaller enclosure, and at a more affordable price. Hence the Model 105.4.

Like all Reference Series Speaker Systems, the Model 105.4 is a product of KEF's "Total System" design approach, where the drive units, filter network and enclosure are developed together to achieve a targeted response.

And like all Reference Series products, it also features the unique S-STOP, a self-powered circuit designed by KEF for total protection against accidental overload and fault conditions.

Of course, the ultimate criteria is in listening. Visit your KEF dealer and listen to the new Reference Series Model 105.4.

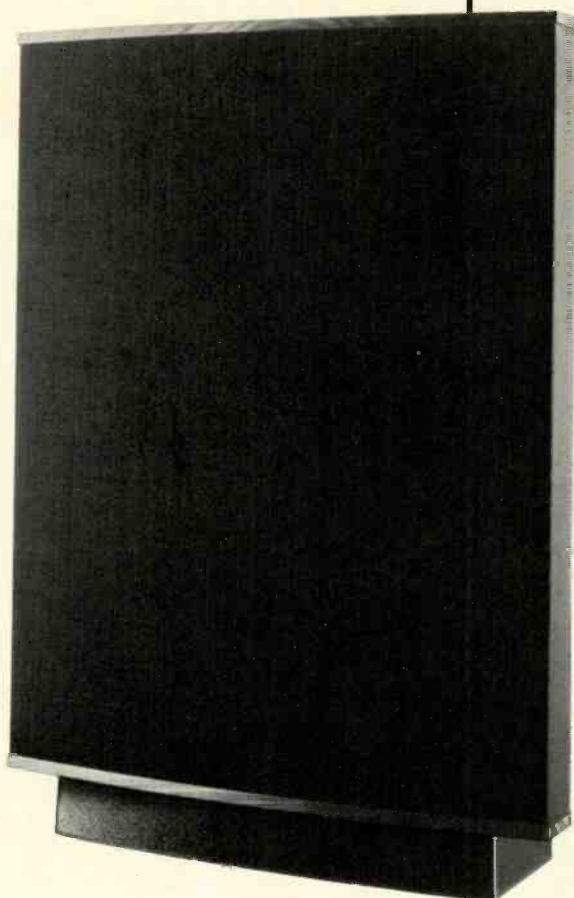
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The Speaker Engineers



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The new ESL-63 is on demonstration at authorized QUAD retailers.

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Longueuil, Quebec J4G 1P8

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## At last there's a cassette transport that fully exploits the precision of quartz.

You expect precision from quartz-locked direct-drive. But with a wow and flutter specification of 0.019% WRMS, the JVC DD-9 goes beyond your wildest expectations.

Audibly, this means complete freedom from pitch wavering. Plus uncanny clarity in the high frequencies thanks to almost total absence of flutter.

What else can you expect from a deck that's this accurate? Dolby® C for one thing. It reduces noise by 20 dB (versus 10 dB with the previous Dolby system). And it operates much farther down into the midrange, giving 15 dB noise reduction even at 500 Hz.

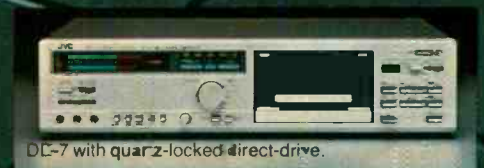
Against this newfound background of silence you'll hear a greater resolution of musical details, especially with wide-range source material.

There's other JVC magic in the DD-9, too. Like our computer B.E.S.T. system that automatically measures every tape you use. Then sets bias, EQ and noise-reduction values to achieve ruler-flat response with lowest possible distortion. While JVC's heralded Sen-Alloy (SA)® Heads give you supremely low distortion plus rugged durability, all in a three-head configuration.

®Dolby is a trademark of Dolby Laboratories.

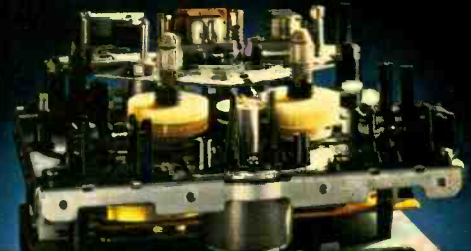
There's also an electronic-digital tape/time counter. Peak/VU fluorescent level meters. Memory and Auto Rewind. And full-logic transport controls.

Is there a place in your system for a deck as accurate as the DD-9? Or the DC-7 or DD-5, both with wow and flutter at 0.021% WRMS? Why not visit a JVC dealer and find out.



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Quartz-locked direct-drive transport.



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EDWARD TATNALL CANBY

**W**e'll have to credit the One and Only for the Walkman revolution, which has already produced a major shift in our nation's and the world's hi-fi listening habits. The Walkman now has a half a hundred siblings on the market, the kind of commercial tribute that speaks for itself. What Sony brought us was super-miniaturization and ultra-mobility, minus wheels, and nobody could be happier than myself. I've been periodically urging the same for a quarter century and more only to see our hi-fi growing ever bigger and more immovable.

Now at last we have featherweight phones, hip-pocket receivers and cassette decks, and you won't hear the last of this development for a long time to come.

The Walkman, plus siblings, plays right into my hands, as well as my ears. A few of us have long insisted that reproduced music, for instance, is an art in itself and does not ever literally bring a concert hall, or any other space, into your living room. You just think so, which is the whole idea. In recording and broadcast we deal with illusions, artfully managed, and that is the very stuff of entertainment. True, we can go quite a way towards creating a sonic space within a space, a sense of a large hall within — or rather, surrounding — our much smaller living spaces. But this sort of thing depends on staying put, both ourselves and, especially, the loudspeakers which provide the illusion. Please, no swinging, swaying, moving concert halls!

And yet we are inexorably moving in just that direction, as well as towards an even more curious illusion, the concert hall outdoors, with no walls at all except invisible reflectors seemingly set up in empty space. Have you noticed the ads? A neat little portable stereo, its two tiny speakers jauntily sitting on some lonely tropical beach a hundred feet from the ocean waves. Very strange concert hall there! And, I suggest, not even dbx and Dolby could reduce the background noise provided by the ocean itself. Nevertheless...

And car stereo. We've devoted whole issues of this magazine to that recent explosion of hi-fi sound on wheels. Is there a crazily rocking concert hall whizzing along the road with you as you listen? Yes, a sense of reproduced space, but



NOT any conceivable literal space, and least of all a concert hall. No need for such a thing. Not any more. Nor do most of us, quite rightly, ever bother our heads about these matters. Car stereo gets along jes' fine, even on a bumpy road.

Thus audio for entertainment moves out of the living room — and out of the concert hall, too — more emphatically every year. And so it is indeed time for us to drop some of our old and persistent concepts of sonic RE-production, with the inevitable tag back to some "original" space being reproduced faithfully, etc. Our sound, our music, now simply IS, for itself, in its own terms, whether you listen to Mozart or to disco.

How differently, for example, do we conceive of television. Does anybody bother to lecture about "reproducing" Yankee stadium in all its original majesty? Sort of big for a living room, but let that pass. No — we are entirely satisfied if we can see useful glimpses of green field and grayish masses of people, of players far and players very near (chewing tobacco), of baseballs that whiz in comet shapes and balls that float slowly as no ball has ever floated in its own too, too solid flesh. It's good all this! But absolutely NEVER a "faithful reproduction of the original."

If we were really being literal, some of those homerun whizzers would crack

straight through the front of the TV tube. End of game.

I am even more content with Walkman and its siblings, because, of course, these tiny walkable "stereophones" do not provide stereo listening at all. The sound is binaural, which can be even better. So now a long-impractical sonic alternative to stereo is suddenly practical — and it is the familiar loudspeaker that is now impractical.

As all walkmen know, a stereo source heard via phones, one channel going exclusively to each ear, is remarkably different from the same sounds heard on loudspeakers, however excellent these may be and often are. Not more realistic via phones, just bigger, more enveloping, much more directional and more demanding of your attention. Like a movie theater versus a small home TV. And even less like any imaginable concert hall! Not to mention the pseudo concert hall of "beautiful music," full of endless reverb which emanates from countless FM stations in two-channel format. Often called stereo. Nowadays, that stereo goes straight into a million Walkman siblings on the hoof. And it is binaural, not stereo, at least in the reception at the ears. Stereo reproduction requires loudspeakers so that both ears hear both channels, from different points in real space.

Virtually all our present sonic enter-

# ...and then came the SE-9.

35 years ago, to satisfy listening preferences, serious music lovers had to redesign their listening rooms. Remove the drapes. Add a rug here. Rearrange the upholstered sofa there. Get rid of that crystal chandelier!

Bass and treble tone controls came later, and they helped—but only a little. When you needed a boost in that lowest bass region, you had to accept boosted upper bass and mid-range tones as well—whether you needed them or not.

By 1958, the first equalizers appeared. They allowed you to alter specific bands of tones to suit the needs of the listening room—and the music program. With special mics, a pink noise generator, and a real-time

analyzer, you could electronically adjust your system to your listening preference. If—that is—you didn't mind spending several thousand dollars and a half hour adjusting and readjusting controls to enjoy a half hour of listening.

Then came Sansui's remarkable SE-9 Compu-Equalizer. It takes the guesswork and the frustration out of equalization. At the touch of a button, the SE-9's built-in pink noise generator feeds its signals first to one speaker, then the other. Sounds picked up by the SE-9's calibrated microphone are then analyzed by its microprocessor. Sit back and watch in amazement, as the SE-9's motorized system moves each of its

16 fader controls (8 per channel) to create the curve that yields precisely flat response at your preferred listening location.

Touch another button, and the curve is memorized for future, instant recall. Move to another location—even another room—and the SE-9 can create and store a new curve—up to four of them.

At last, after 35 years, a perfect equalization system without errors or frustration. And, at a price that makes perfect equalization affordable for all serious music lovers.

See the SE-9 and Sansui's truly complete line of high quality components and systems at your Sansui dealer today. Or write to us for details.



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**K**enwood presents  
a system whose sum  
is greater than  
any single component part.



Up to now, the only way for a serious listener to put together a truly great audio system was one piece at a time. Which is why we created the new Kenwood R-11 Audio Purist System. Five of our most advanced components, matched to perform in perfect harmony.

We think it's the first complete system the purist can listen to seriously.

**KA-900 Hi-Speed Integrated Amplifier.** Features Kenwood's exclusive Sigma Drive technology to literally force speakers to behave in perfect synch with amplifier output.

**KT-900 AM/FM Stereo Tuner.** With touch-activated Servo-Lock tuning for incredibly accurate, drift-free FM reception.

**KT-670 Fully Automatic Turntable.** With high-inertia, quartz-PLL direct drive system for precise speed accuracy.

**KX-900 Random Access Memory Cassette Deck.** Computerized RAM memory search control gives complete, automatic access, in any order, of up to 15 cuts per cassette side, or even the entire side.

**LS-1000 2-Way Loudspeakers.** Active planar radiator system and unique double baffle construction to eliminate vibration and resonance.

**R-11 Chrome and Glass System Cabinet.** Custom-designed system cabinet displays all components behind stylish tempered glass doors.

**KENWOOD** Audio Purist

Not all Kenwood dealers carry these products. For the Audio Purist dealer nearest you, write Kenwood, P.O. Box 6213, Carson, CA 90749

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With true binaural sources, the Walkman phenomenon may still have more than half its revolution ahead.

tainment is stereo-intended, that is, designed to get the most out of the loudspeaker type of listening. Phone-style binaural reproduction of this material is not the idea at all. No matter! The binaural-type listening tweaks your ears into some remarkable hearing sensations, even if unimagined by the producers. The plus value is terrific, if strangely unreal in any literal sense.

Unreal, of course, only if you are pre-occupied with that evanescent "reproduction of the original space," which you aren't if I guess right. Who cares? Not a Walkman wearer, obviously. You more likely feel that the inner sound, behind those phones, is more "real" for you, much better, than the drab effects of some theoretical real-life recording place. It's a new sonic high. If actions speak louder than words, if money talks, then this Walkman revolution tells us a great deal about the way we listen to our fi. It is real in itself, as is.

It's getting so you can't strike up a casual conversation any more. You can talk ("Which direction is Times Square?") and he or she can hear you, mostly, right through the little phones. But the mind is elsewhere, the soul is transported, and there's that far-away look. It's a real question — are we out here? Or in THERE?

Picture one of New York's pleasantly decrepit Hudson River piers late last fall. Dozens of comfortable bodies lying around, soaking in the last of the year's warmth. Gentle breezes, blue sky, lovely waterscapes (if you don't focus too closely) and silence, except for the mild slap of the waves under the pier, the buzz of a helicopter, distant shriek of a police car, the call of a gull overhead. Nice sonics! Real, natural.

In the middle of the pier, though, stands a young fellow with his eyes closed, his face turned aloft. He is dancing; the knees pump vaguely, the arms swing. And every so often a quavering, tuneless banshee cry comes from his lips, an incipient wolf or maybe a coyote howl. Half-hour later, he is still there, the tuneless wails more frequent. Crazy as a loon? Not a bit. He has featherweight phones on his head and his loon cry is merely a sing-along, to the music inside. He doesn't even know he's singing, because he can't hear himself. But 50 other people can.

Local newspaper shows its weekly

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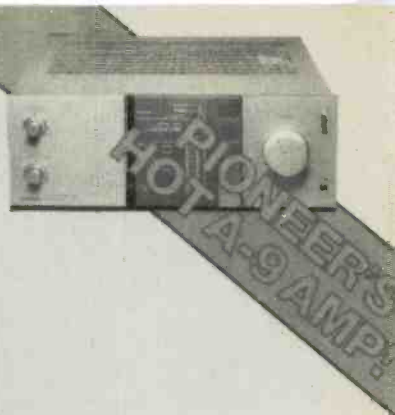
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**Hurry—the holidays are getting close!**

## THE DL-300 SERIES



**DL-300** This may well be one of the most significant cartridges in Denon's history, because it brings the price of Denon Moving Coils under \$100. Yet, it offers all of Denon's significant moving coil technological developments, such as a two piece cantilever and dual-damping rings for optimum resonance control, and no pole pieces for lower mass and more efficient manufacturing.

(Shown with stylus guard removed.)



**DL-301** To control resonances, the cantilever fulcrum of all Denon MC cartridges is independent of the damping rings. The DL-301 uses two damping rings, each optimized for its portion of the frequency range.

In addition a special magnetic structure eliminates pole pieces, reducing both weight and cost for the best sonic value in MC cartridges.

(Shown with stylus guard.)



**DL-303** The first of the DL-300 Series, the DL-303 has repeatedly been judged "best of its class." It features Denon's cross-shaped coil and dual cantilever design and a special tensioning device that maintains ultra-high performance for extended periods.

# DENON

Imagine  
what we'll  
do next.

Denon America, Inc.  
27 Law Drive, Fairfield, N.J. 07006

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No one could be happier than I am about the shift in listening habits produced by the Walkman.

"write the caption" photo, \$5 for the best title. Last week it was an irate turkey gobbler. This picture shows a young burly tennis player on the court, his Prince-type racquet obviously in motion, half-way through a solid drive into the far corner of the opposite court. In his mouth is half a fat cigar. On his ears are the inevitable featherweight phones. "Best of both worlds"?

Sometimes I think that at least a quarter of the rush-hour passengers in our local transit system are wearing Walkmans (Walkmen?) or equivalent. What a pleasure! For the rest of us, too, with no more squalling portables to blast the noisy environment. There's always that fond, bemused look, off in some sonic never-never land, whether it's Mozart or the aforementioned "beautiful music," complete with synthetic reverb. Maybe in summer the transit air conditioning doesn't work and in winter the heat is off and ventilation nil, but at least we can take ourselves away, in THERE, via our ears. It does help.

Please, may I say, do not think I am deserting our tried and true base product, hi-fi equipment of excellence in a rock-solid home environment. All of the above observations are simply for perspective in a time of change, and Walkman won't "kill" our hi-fi any more than the videodisc will. But as you can see, many aspects of the Walkman revolution do please me, because I see them, hear them, as positive and new. We can still do things with our big, bulky equipment, the sort that doesn't move. Plenty.

A friend, now in SF, has a new system in his enormous converted basement triple garage, maybe at a guess \$10,000 worth. He is blamped and triamped everywhere, with readouts twinkling in all directions, and this new system includes "earthquake" subwoofers all the way around (coals to Newcastle?), which I liked very much indeed.

Is a man who glories in these tons of immovables going to go for Walkman? Could be. There are many ways to listen to reproduced sound, to the taste of each of us, and subwoofers though nice are not necessarily required for good listening. Walkman offers different values, no less potent.

I am sure that the outstanding Walkman value is in the binaural reproduction these featherweight portable systems now offer with such total ease. Even

though virtually all its musical sources are intended for stereo via speakers, the Walkman shows that, given half a reasonable chance, the binaural effect is a powerful thing. I've always thought so. Every five years or so I write about it again. Ever since 1953, but always in vain. Impractical! Which means, in commercial terms, that it won't sell. It didn't. Even the modest continuing vogue of the earlier and more bulky attached "stereophones" was limited by their nuisance value, weight, dangling wires, pressure against the head and so on. Too clumsy, too esoteric. And the phones which got their signal by means of an infrared beam of light (or is it heat?) have their problem, since it is rather easy to get out of broadcast range, so to speak, by going into the next room—or even downtown.

But now look. Suddenly, one-half of the binaural system IS selling en masse and should keep selling. It is so easy, so featherlight, so convenient, effective, comfortable, persuasive — how the picture has changed! Miniaturization, unprecedentedly clever, was the answer.

So now what about the other half, the sonic signal source, binaural signals directly intended for phones, not speakers. (Well, we must make some compromises but they are easy.) At this moment there are virtually no binaural recordings or broadcasts aimed for phone listening. Just a few tries, here and there (and some of them way off the beam, as I know from listening). Yet paradoxically there's a whole new *literal* realism available if you record in this fashion, directly for phones — in space perception, sharp directionality, lifelike naturalness. It's a new game. Nobody has tried it yet commercially. Somebody will, I'll bet.

Meanwhile, do it yourself. So easy. You do NOT need a dummy head (which merely adds subtle and aesthetic bits of refinement). Any two mikes, preferably omni, mounted a head apart or as far as a foot and a few inches, like the built-in mikes on many cassette recorders, will do the trick sensorially. Start with speech. People, sonic snapshots like Polaroid. Any old environment will do, the noisier the better. Just shoot, from any old location (forget your "mike technique") and play back. Via phones. NOT loudspeakers. Then you will hear why the Walkman revolution still has a lot ahead of it, binaurally speaking. **A**

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## Tape Type-Casting

*Q. I would like you to explain the differences between tapes denominated as Normal, CrO<sub>2</sub> and FeCr with respect to quality of sound reproduction.*—Marc Weingarten, Havertown, Pa.

A. Reviews of cassette tapes by *Audio* in the recent past (e.g. "The New Cassettes: Performance Update," September 1981) indicate that it is difficult to make any generalizations as to which type of tape is best with respect to frequency response, noise and distortion or with respect to overall performance. The differences in performance seem to be greater between brands than between types of tape (assuming we are talking only about the three types you named and not about cobalt-modified or metal-particle tape).

Where the tape types differ is in terms not of performance but of "adjustments" required to achieve the performance of which they are capable. The Normal (ferric oxide) tapes require somewhat less bias current than the others. In playback, different playback equalization (more bass boost) is suited to the CrO<sub>2</sub> and FeCr tapes than to the ferric oxide tapes.

## Period of Adjustment

*Q. I own a new open-reel tape deck. Should I have it adjusted to the tape I select even though the deck has both a bias and equalization selector for both standard and low-noise tape?*—Joseph Van Valen, Los Angeles, Cal.

A. If, after experimenting with various settings of bias and equalization, you find that you can record a tape so that it is a faithful copy of a source such as a phono disc, I see no need to have your deck adjusted.

## Purchasing Priorities

*Q. I am planning to buy a cassette deck that costs \$600, but I see that other companies have come out with the same type of deck for a much more reasonable price. I wonder if I should stick with my original choice or purchase one of the others, although I can afford to buy the \$600 unit.* — Juan Placencia, Kansas City, Mo.

A. What you get for your money isn't always immediately visible. What you might be getting for more money includes such things as better construction and design (so that the equipment is

freer from maintenance and service problems), better performance (such as flatter and more extended frequency response, lower noise, and lower distortion), closer adherence to specifications, a better warranty or one that is backed up more fully, etc.

## "Y" Two Decks

*Q. My amplifier has connections for two tape decks, but I want to add a third for dubbing purposes. Can I use Y-connectors to hook up two of the decks to the same jacks? Will this cause a decrease in performance or damage?* — James Lamparter, Washington Boro, Pa.

A. Using Y-connectors is unlikely to do any physical or electrical harm. However, they may impair performance in terms of frequency response or distortion level.

A better course would be to purchase an external tape switch box, available at fairly reasonable cost. Such a device, for example, can accommodate three decks and permits dubbing from any one to either or both of the others. Some tape switches can accommodate more than three decks, but of course they also cost more. These devices are connected between the tape-in and tape-out jacks of an audio system's preamp or receiver.

## Unequal Footings

*Q. I recently bought some 10½-inch reels containing 3600 feet of tape and obtained very good recordings, in addition to which I get over 12 hours from one reel when it is recorded in both directions at 3¾ ips. I would like to know why there aren't any 7200-foot reels on the market.* —G. Tsimis, Downsview, Ont., Canada

A. As a tape is made thinner in order to permit more footage on a reel, its quality tends to deteriorate in terms of distortion and signal-to-noise ratio. Also, the tape is more subject to print-through, and there are increased physical problems in transporting it at high speed. Hence the absence of 7200-foot tapes.

## Transportation Aid

*Q. I have a tape transport which I use for playback. I used to feed it into a preamp which supplied tape playback equalization and amplification, but I replaced the preamp with a receiver which doesn't accept signals directly from a tape head. What, if anything, can I do so*

*that I can continue to use my tape transport?* — R.E. Lemmel, Irving, Tex.

A. Some audio stores carry inexpensive tape head equalizer-amplifier units. Such a unit is often intended for use with either a phono pickup or a tape head, with a switch to choose between the two. The output of the tape head would be fed into this device, and the output of the latter would be fed into a high-level input of your receiver — such as one marked AUX or tape input. If you cannot find such a unit in your local audio stores, try the large mail-order audio houses. It typically costs under \$50.00.

If your search is unsuccessful, you might be able to get reasonably satisfactory results by feeding the tape head signal into the phone input and tailoring the signal with bass boost and treble cut.

## Volume Views

*Q. I recently purchased a cassette deck and asked my dealer for instructions on making tape recordings because the manual is of little help. The manual says to adjust the recording volume so that the meter does not go over 0. The dealer says the very loudest portion of music should just reach but not go over 0. Some hi-fi buffs say the meter should go past 0, to 3 or more, during the loudest portions of the music. The deck manufacturer's sales office says that I can do it either way, that there is no distortion with my deck until the meter goes past 3. Please tell me which is the proper method.* — H. Ellinson, Delta, B.C., Canada

A. There is no absolute answer to your question because it depends on what tape you are using. For a given level of distortion on the tape, some brands or types of tape can accept a higher input level than others. My own inclination would be to follow the manual's instructions and not go above 0 VU. At worst, you would be losing only 3 dB of signal-to-noise ratio. Inasmuch as your deck probably has something like 65 dB of S/N ratio in the Dolby mode, the loss of 3 dB in S/N should not be troublesome unless you play your system at extremely loud levels.

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



# Bob Carver tells you (briefly) how Sonic Holography works. (Others tell you how it sounds.)



**Q.** Exactly what is Sonic Holography?

**A.** It's a term I use to point up the similarity of the sonic illusion that enables one to hear a stereo recording in three dimensions, and the optical holographic illusion that allows one to see a flat photograph in three dimensions.

**Q.** What does Sonic Holography sound like?

**A.** I'll let others answer that for me. Hal Rodgers, Senior Editor of Popular Electronics: "When the lights were turned out we could almost have sworn that we were in the presence of a real live orchestra."

Julian Hirsch of Hirsch-Houck Labs: "The effect strains credibility—had I not experienced it, I probably would not believe it... the 'miracle' is that it uses only the two normal front speakers."

Larry Klein, Technical Director of Stereo Review: "...it brings the listener substantially closer to that elusive sonic illusion of being in the presence of a live performance."

And High Fidelity put it this way: "...seems to open a curtain and reveal a deployment of musical forces extending behind, between and beyond the speakers... terrific."

**Q.** How many speakers are needed for Sonic Holography?

**A.** Just your usual two. But for optimum Sonic Holography, the speakers *must* be equidistant from the listening position, and somewhat closer together than is usually required for stereo.

**Q.** What do I hear when I'm not in the middle?

**A.** We'll let Julian Hirsch describe what he heard: "still noticeably better than normal stereo, particularly in respect to a greater sense of 'warmth' such as is experienced in a concert hall."

**Q.** How does Sonic Holography differ from stereo reproduction?

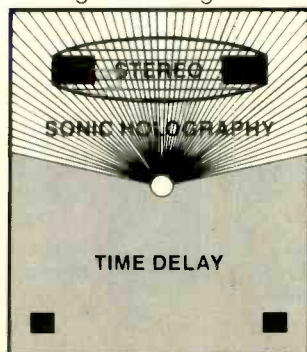
**A.** Very significantly. Simply put, in a live performance, each instrument is a source of sound that reaches your ears as two sound arrivals—one for each ear.

The difference in strength and arrival times at each ear provides the primary cues that your brain uses to localize and create all the sonic images.

In stereo reproduction, *four* sound arrivals produced by each instrument reach your ears—two arrivals from each speaker for each ear.

That's precisely two too many for accuracy. And that's why directionality in stereo is limited by the positions of the speakers.

Sonic Holography eliminates those unwanted extra arrivals by carefully calculated and controlled electronic techniques, including complex cross-fed interference signals. These signals combine in space with the primary signals, creating sonic images outside



and beyond the boundaries of the two speakers.

There is a clear sense of the acoustic space, and the spatial information (phase and timing) of the original performance is deployed naturally over a broad, deep arc in front of you.

That's why Larry Klein described Sonic Holography in Stereo Review as producing "a far more plausible

sonic illusion of space and localization than is produced by normal stereo."

**Q.** Isn't Sonic Holography something like time delay?

**A.** Not at all. The goal of time delay is to recreate only the spatial *ambience* of the original recording environment. And to do that it requires additional amplifiers and rear speakers.

**Q.** How can I add Sonic Holography to my system?

**A.** Three different ways.



**The C-4000** Control Console includes the Sonic Hologram Generator plus: a full-function stereo preamplifier, a time-delay system with built-in 40 watt (total) power amplifier for time delay speakers, the Autocorrelator system that reduces noise up to 8 dB with any source material, and a peak limiter/downward expander that nearly doubles dynamic range.



**The C-1** combines the Sonic Hologram Generator with a full-function preamplifier.



**The C-9** Sonic Hologram Generator allows you to add Sonic Holography to any system, including one with a receiver.

**Q.** How can I get more information?

**A.** Easily. Just write to us

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On the other hand, if you do want to hold on to every possible dB of S/N ratio, buy some high-quality tapes and try recording at levels up to 3 on the meter. If your ears detect no increase in distortion or deterioration in treble response, then going up to 3 dB is validated for the tape in question.

#### Strength in Decks

**Q.** I have a problem with one of two cassette decks connected to my receiver. In playback, it produces a much higher volume level than the other, and I'm afraid of damage to my speakers. Its output is rated at 1 V, whereas the output of the other deck is rated at 410 mV. Could

this be the reason? — Robert Macheska, Ransom, Pa.

**A.** The difference between the rated output levels of your two decks is 7.7 dB, which does not represent that great an audible difference. It takes about a 10-dB difference for one source to seem twice as loud as another. Therefore, based on rated output, one deck should appear only moderately louder than the other.

Have you switched the two decks at the input to your receiver? It is possible that the receiver has a different gain for each input.

Of course, it is also possible that one of the two is at fault, providing a good

deal more or less than the rated output. Although this doesn't seem very likely, if such is the case, it would not be difficult for an authorized service station to change the output signal to the customary level of about 0.5-V maximum.

#### Signal Affections

**Q.** Do the volume or tone controls of a receiver have an effect on the signal being recorded by a tape deck? — Dwight Gaines, Cleveland, Ohio

**A.** In the great majority of receivers (and preamplifiers), the signal fed to the tape deck is unaffected by the tone and volume controls. In a few cases, though, the user is given the option of taking the signal from a point after the tone controls. In no case that I know of is this signal taken from a point after the volume control.


#### Tape Scrape

**Q.** I enjoyed playing metal tapes with my cassette deck until I was told that this could harm the tape heads. What do you think? — J.C. Spencer, Wilson, N.C.

**A.** Thus far I have heard nothing to the effect that metal-particle tapes are more abrasive than other kinds of tape.

#### Spec Skeptic

**Q.** What gives with frequency response in cassette decks? Recently an audio consultant/dealer told me that the claimed 20 Hz to 18 kHz response of cassette decks is measured at -20 dB, a level I may not hear and also a level that the VU meter or LED indicator of my deck may not even register. What good does this type of measurement do for consumers? Why don't they measure frequency response at typical recording levels, such as 0 dB? — Con Schieder, Delta, B.C., Canada

**A.** Yes, cassette frequency response is typically measured at a level 20 dB below the level that produces about 3 percent harmonic distortion for a frequency of about 400 Hz. But most of the music that you hear is down this low or lower, so that it makes a good deal of sense to measure at this level, even though your meter may not make you fully aware of this. (Incidentally, some meters or other indicators do go down to -30 dB or even -40 dB, and then you can see a good deal happening.) Only occasional peaks get up in the vicinity of 0 dB, and it is at this level that distortion threatens to become disturbing. Measurement at the 0-dB level, which corresponds to a minor portion of what we hear, would show treble response extending essentially flat to about 8,000 or 10,000 Hz for all but metal-particle tapes. In sum, the way that frequency response is measured, while not perfect, makes good sense. 

# CLEARLY A BETTER FM ANTENNA

## The G·A·M Stereo One

If you've been looking for a better FM antenna, one that,

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**Stereo One** is a high performance vertical antenna offering up to double the gain of a conventional dipole. Being vertically polarized, it is fully omnidirectional requiring no expensive and cumbersome rotor system. Vertical polarization is less susceptible to multipath as well. **Stereo One** stands just 76" tall and weighs a mere 12 oz.

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Initial testing took place in the mountainous interior of New Hampshire where only 2 FM stations could be received on a conventional dipole. With **Stereo One** hooked into the system, the station count rose to a staggering 25+ with most in very acceptable stereo.

**Stereo One** was also tested in Toronto, Canada where, like the canyons of Manhattan, multipath abounds. On testing **Stereo One**, Andrew Marshall, editor of Canada's FM Guide Magazine wrote, "the **Stereo One** showed immediate superiority in terms of usable stereo signals, eliminating all of the multipath and between stations junk I'd become accustomed to as a part of city life." (May '81)

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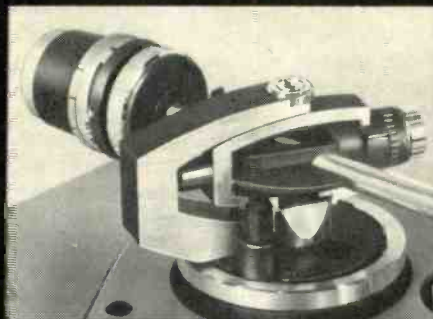
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# The worst warped record in your collection can lead to the best investment you ever made.

If you have a record in your collection that's too warped to play and too valuable to discard, we have a suggestion for you.

Bring that record to your audio specialist and ask him to play it on a Dual ULM turntable. You will hear the music the way it should be heard. Because the ULM tonearm will track that record as if it were perfect.

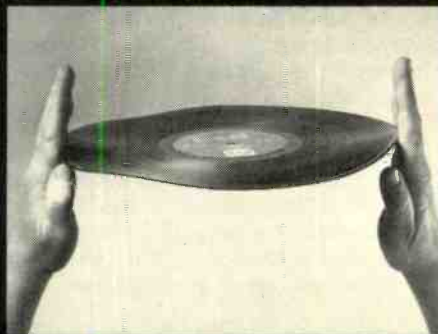
ULM is Dual's exclusive Ultra Low Mass tonearm system, with total effective mass of 8 grams. That's less than half the mass of conventional tonearm and cartridge combinations. And there's no mistaking the difference ULM makes in what you hear.



That difference has been confirmed by the independent test labs that tested ULM with warped records as "real-life" test instruments.

"...tracked the most severely warped records in our collection, usually so well that we heard nothing wrong."

—*Stereo Review*



"Navigating the worst warps we could find, the Dual/Ortofon combination proved very agile indeed, with nary a mistrack."

—*High Fidelity*

"Even a severe warp that would normally throw the pickup into the air will usually give no more than a slight 'thump'... and most warps are undetectable by ear."

—*Popular Electronics*

"The Dual takes dead aim at the fiend of disc reproduction—the warped record—and response to record warps practically is eliminated at the source."

—*Stereo*

One lab also listened to a favorite *unwarped* record played by the same ULM tonearm and cartridge system. Its reaction:

"There is no way measurements, or mere words, can describe the acoustic presence... highs are crystalline, with a purity we haven't heard before. The bass is so clean that one can hear new sounds from records, such as the harmonic vibration of unplayed strings on the double bass... overall definition and transient response were outstanding."

—*HiFi/Stereo Buyers' Guide*

Now just think about all the records in your collection you can enjoy once again. And all the records yet to be bought.

Then consider the one-time investment in a Dual. An investment that may be less than you think.

For example, the single-play, semi-automatic Dual 508 with Vario-belt drive is less than \$160. And the low prices of the nine other new Dual ULM turntables may also surprise you.



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United Audio is the exclusive U.S. distribution agency for Dual.

## Tried and True Test Records

*Q. I have read different statements to the effect that various test records differ by perhaps a few decibels from what is considered to be really "flat" RIAA frequency response. This situation seems odd to me. If it is also true that there is no real agreement as to which is the more accurate when differences do occur, this seems almost unbelievable.*

*Should it not be a fairly straightforward procedure for a lab equipped with a scanning electron microscope to measure the groove amplitudes at various frequencies (at least laterally cut discrete frequency bands), and thus determine the accuracy of amplitude vs. frequency?* — Jack W. Brent, Seattle, Wash.

A. Good test records should not disagree. I have personally checked two and found them to be in very close agreement, probably within 0.5 dB. These are the CBS Technology STR-120 and the NAB test record. The first is available from CBS Special Services, 3651 Fruitridge Ave., Terre Haute, Ind. 48705, and the second from Gotham Audio, 741 Washington St., New York, N.Y. 10014.

While it is true that a laboratory could use an electron microscope to measure groove amplitudes as you have suggested, correlating them to record diameter vs. wavelength, such measurements are routinely made by specially prepared light sources. Means are provided to accurately measure the reflected light, and this arrangement has proven to be very accurate.

When you delve deeply into this, you will discover that there are inaccuracies far more significant than the possible disagreement between good test records. You will find that, on different days, using the same test record and the same phono cartridge, your results will differ with each test run made. This has to do with temperature vs. compliance of both the vinyl material of which the disc is composed, and that of the cartridge.

When I want to make a frequency run on my cutting system and really want to ensure accuracy, I must check the playback cartridge with a relatively new, fresh test record beforehand in order to monitor performance. The deviation from flat response must be taken into account when comparing my results to those obtained when cutting my own test frequencies.

## Dim Watted

*Q. On the tuner section of my receiver, the lights at one end of the dial are darker than the rest. Will this affect performance?* — Richard Pizzo, Canterbury, Conn.

A. Dim lights are not likely to affect performance. This dimness may be the result of some basic problem associated with the basic layout of the dial and/or placement of the individual lamps. It is possible, too, that one of the lamps is defective, resulting in this condition.

## Bad Vibrations

*Q. If I tap my finger on either the base or turntable platter when playing records, the result of this action can be heard through the speakers. This tapping can be heard only when the stylus is on the record. Is this normal?* — Jeff Culbertson, Overland Park, Kans.

A. What you are experiencing is closely related to acoustic feedback, except that you are stimulating the phono cartridge through the base or platter by hand rather than by means of the sound output of the speakers. This is normal, in that it is what is supposed to happen, though it is not particularly desirable. When you tap the base or platter of the turntable, this causes the record to vibrate, which in turn causes the phono cartridge's stylus to move. It is this stylus motion which produces the sound, desired or undesired.

## Further Notes on FM Distant-Signal Reception

*In the July, 1977, installment of this column, you answered my question about "FM Antennas for Reception of Distant Signals." I have additional information on this same subject.*

*One does not often come across reviews of FM antennas, but here are two references: Consumer Reports, July, 1973, pp. 465-469; Consumer Guide: Stereo Series, Summer, 1974, pp. 6-17.*

*An organization called the World-Wide TV-FM DX Association (P.O. Box 163, Deerfield, Ill. 60015) publishes the VHF-UHF Digest, which is a periodical dealing with many aspects of DX; FM Atlas and Station Directory is helpful in locating and identifying FM stations but most important, a little booklet called Beyond Shortwave is very easy to read and would probably interest other Audio*

*readers. The association also gave me a list of their members who probably would be willing to help someone in their area.*

*The TV-FM DX Association shares your distrust of signal amplifiers but mentions that some DXers build low-noise, tunable, selective amplifiers with high-quality electronic components and obtain excellent results.*

*The most complete reply from a commercial source was from the Winegard Company (3000 Kirkwood St., Burlington, Iowa 52601) which offered specific recommendations for employing their consumer products in this type of application.*

*A local MATV/CCTV/video company (6NS Telesystems, Shelburn, Vt.) has lots of information on commercial-grade, low-noise amplifiers and specially cut antennas. They were very willing to offer helpful data and suggestions, although much of this equipment is very expensive.* — Ron McKinnon, Middlebury, Vt.

Even where a signal amplifier exhibits a good S/N ratio, one must take into account the presence of local signals. These signals will be amplified along with the weaker ones you desire and could overload the amplifier, but if this does not occur, they could be capable of overloading the front-end of the tuner. In either instance, an overload will decrease the sensitivity of the equipment to weak signals; further, it will make the front-end nonlinear. Nonlinearity in r.f. circuits will act the same as nonlinearity in audio circuits: Intermodulation products will be created, taking the form of spurious signals at dial settings on which such signals should not appear. They are capable of blocking out desired signals which should be received at such dial settings.

## Tonearmaments

*A. After getting a new turntable I have had a persistent problem. When the tonearm is moved over the platter with the turntable running, regardless of whether or not a record is actually playing, I pick up a "popping" and "ticking" noise much like static. If you know of a solution for this problem through shielding, filtering, or any other method, please let me know.* — Eron Lee, Tempe, Ariz.

A. I think the lack of grounding of your tonearm is the problem. Often such

grounding is carried through by way of the various pivots. If there is any oxidation or "slop" which can lead to poor electrical connections, grounding will become intermittent.

It may be that you can relieve this condition by lubricating these pivots with WD40 or a lubricant recommended by the maker of the tonearm.

If this does not cure the problem, I suggest running a flexible wire from the tonearm proper back to a ground point on the turntable base.

There is also the choice of returning the arm to its maker for the appropriate repairs.

#### Bass Brawl

*Q. It is my understanding that sound is the result of air set in motion, and the lower the note to be reproduced, the more air that is needed to be set in motion. If this is true, does it follow that the larger the speaker, the lower the frequency of a note it can produce? Is there more involved than size in determining*

*how low a frequency a speaker can produce? Specifically, can two 8-inch woofers move more air (and hence, produce lower notes) than one 12-inch woofer? — John S. Vizard, West Hartford, Conn.*

A. In one way or another, if we are to produce lower and lower frequencies, we must move more and more air if all of these frequencies are to have equal measured or perceived amplitude. We can move that air via loudspeakers in two ways and still have the same amount of bass: By moving a small cone over a great distance or by moving a larger cone over a proportionately smaller distance.

It is certainly true that given an equal distance of cone excursion, the speaker having the larger of the two areas will move the most air. Inasmuch as the two 8-inch speakers have a total combined area greater than one 12-inch speaker, the combination of two 8-inch speakers will move more air than does the 12-inch speaker.

Some speakers are designed to have greater cone travel than others. Hence, this fact must be considered when comparing the possible amount of bass response that a given speaker can produce. In addition, you must consider the effects of the enclosure in which the speakers are housed. You can have a speaker of a given size which has a rather small amount of cone travel and produces bass equal to that of a speaker having a large amount of cone travel if the proper enclosure is used, one which makes use of otherwise wasted backwaves.

Speaker design is very exacting and complicated. Even with this brief explanation, you can appreciate the many interrelated problems which must be taken into account. A

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

## Ever hear a Ruby?

It takes more than a ruby cantilever to make a moving coil cartridge capable of excellent sound reproduction. It takes imagination, engineering knowledge and dedication to perfection.

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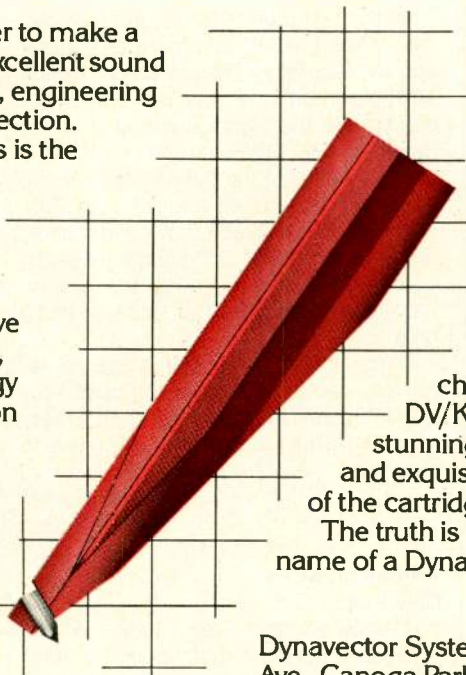
$$C_B = \alpha \sqrt{2\pi f} \left[ 1 - \frac{1}{4} \beta \frac{2\pi f}{\alpha^2} + \frac{1}{4} \delta (2\pi f)^2 + \dots \right]$$

$$\alpha^4 = \frac{EI}{m}, \quad \beta = \rho \alpha^4 \left( \frac{1}{E} + \frac{\gamma}{G} \right), \quad \delta = \frac{\rho^2 \gamma \alpha^4}{EG}$$

Dr. Noboru Tominari, the creative genius and founder of Dynavector, developed a radical new technology taking into account wave dispersion and cantilever vibration theories.

Dr. Tominari reasons that the "soft" sound of most cartridges was due to the various delays of frequencies along the length of the cantilever.

The role of the cantilever as a sound dispersing medium has been mitigated by making it as



short and as hard as possible. As a result, a solid laser cut synthetic ruby cantilever only 2.5mm in length with a diamond contact tip is utilized.

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## Amp Updates

The Double Barreled Amplifier project which I presented in *Audio's* April and May 1980 issues can be updated by installing a 10-ohm 1/2-watt resistor in series with the base lead of each of the eight output transistors Q20-Q27. These resistors should be mounted on the transistor sockets and completely covered with heat-shrink tubing to provide electrical insulation and mechanical strength against lead breakage due to possible flexing of the resistor leads. These resistors will damp out possible parasitic oscillations caused by the inductance of the connecting wires. In addition, resistors R1, R58, and R59 should have a 0.1- $\mu$ F polyester capacitor soldered in parallel with each. These improve the chassis grounding at high frequencies.

W. Marshall Leach, Jr.  
Atlanta, Georgia

## Elcaset Live!

Dear Editor:

You are my last hope in finding out more information about the five-year-old Elcaset format. I still have all of the articles you published on the format.

My persistence in supporting the Elcaset has paid off very well since I have picked up numerous machines for under \$100.00 brand-new and tapes for \$4.00. And the stereo salesmen have been very happy to unload them.

The problem now is in finding tapes. I've bought out just about everybody. Do you know of any dealers? You could help about 10 of us — yes, there is an Elcaset Club of America! Sony had promised to keep them available eight more years.

Our other question regards the "control tracks." Is there any way to change the heads and/or the electronics on present machines? We haven't been able to get any information from the companies on this.

Greg McIntyre  
Box 34082  
Atlanta, Ga. 30332

*Editor's Note: We asked our contact at Sony about the situation, and he replied:*

To begin with, we at Sony appreciate this long-term support of our products, especially in regards to the formation of an Elcaset Club of America. As you well know, there are still many hundreds of

Elcaset recorders still in use throughout the country.

Regrettably, there is no factory-authorized procedure that has been released to the field covering the installation of "control tracks." Any modification to the head block assembly or electronics of a Sony Elcaset machine would have to come from an outside specialist, perhaps someone working in the computer hardware field.

I am happy to inform you, however, that you and other Elcaset owners can now purchase blank cassettes directly from Sony. Just send a check or money order (sorry, no cash accepted), to: Sony Corp. of America, Tape Div., Consumer Relations, 9 West 57th St., New York, N.Y. 10019.

The prices are as follows: LC-60 SLH, \$8.00; LC-90 SLH, \$10.60; LC-60-FeCr, \$10.60, and LC-90FeCr, \$12.80. Please add 8 1/4 percent New York City sales tax to any order.

Marc Finer  
National Training Manager  
Sony Corp. of America  
New York, N.Y.

## Taping Tip

Dear Editor:

In the October 1981 issue of *Audio*, the "Tape Guide" column offers a few tips for recording 78-rpm discs. I think one important one was left out: Make certain that the signal is mixed down to monaural BEFORE the recorder. This cancels out all of the out-of-phase noise, and there certainly is a lot of it on 78s. (Must be the shellac!) It will most likely require a couple of "Y" connector patch cords to do this because the stereo-mono switch is after the tape-out jacks ordinarily.

Once the out-of-phase signal is removed, you will be quite surprised how quiet 78s actually are. I also strongly recommend a stylus specially designed to play 78s.

Mike Miller  
Bethel, Conn.

## Angles on SLTs

Dear Editor:

I really enjoyed Gary Stock's article on linear tracking turntables in the June 1981 issue of *Audio*. As a former owner of a Rabco SL-8, I have followed the development of later models of SLTs with extreme interest. It has been gratifying to

see the SLT concept evolve into the sophisticated models available today.

Mr. Stock's observations on the angular deviation of SLTs was certainly a pertinent issue. Another SLT design concept, which would be difficult to implement, is the reduction of the vibration resulting from the movement of the servo-driven arm base to keep the arm tangential to the groove. In the old Rabco design, some vibration or rumble was caused by the arm assembly rolling across the "rails." Some of the new designs use essentially the same type of guides, and they could suffer the same degradation of sound. Lamentably, your review of the Mitsubishi LT-30 did not examine this potential problem area. Perhaps conventional rumble tests aren't well suited to detecting this phenomenon, which is intermittent.

Vade G. Forrester, Jr.  
San Antonio, Texas

*George Tillett, who reviewed the Mitsubishi, replies:*

Mr. Forrester's letter brings up some interesting points on SLT design, but as far as the Mitsubishi arm is concerned, the angular deviation is quite small, with the maximum tracking error being less than one degree. (The 1.76 degrees referred to applies to a 10-inch arm.) The rumble test is usually made over a total period of several minutes, and it would certainly include rumble and other deviations caused by irregular arm movement.

## Pole Desires Penpals

Dear Editor:

My name is Waldemar Nowacki. I am 25 years old, have finished studying, and live in the city of Lodz, Poland. I would like to get acquainted with your country and somebody who has interests like mine.

I am interested in sports and games and music, especially electronic music. Of course I am interested in hi-fi, but I am most interested in electro-acoustics and measuring apparatus. I make a low frequency amplifier amateurishly. I wish to exchange observations and experiments in this subject.

I apologize to you for mistakes in my letter because I am learning to write English and I'd like to try my hand at it.

Waldemar Nowacki  
9 Janiny Street  
93-563 Lodz  
Poland

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result is exceptionally uniform extended frequency response, unusually wide dynamic range, outstanding transient accuracy, low distortion, perfect "point source" stereo imaging and superior driver linearity. And one further advantage instantly converts the price from an expenditure into an investment. The extremely advanced design and new technology embodied in the L1230 ensures that it will not become obsolete with today's fast-developing improvements in program source material quality.

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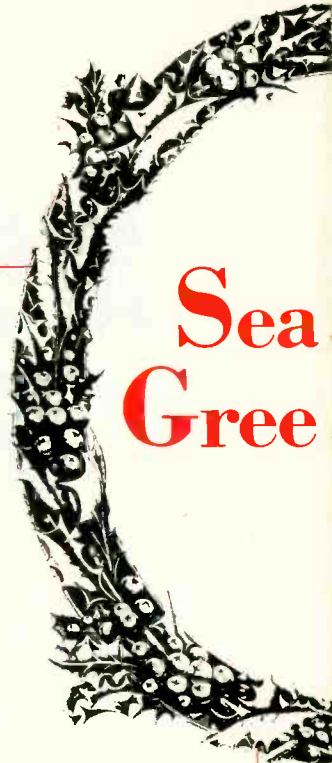


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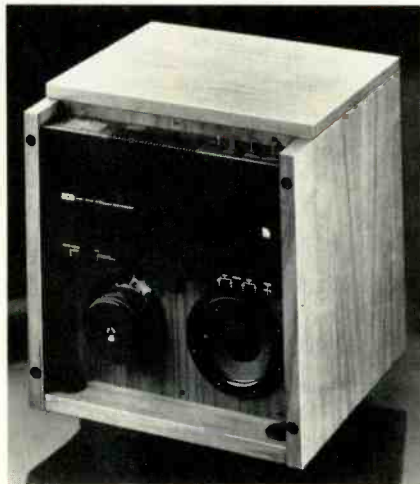


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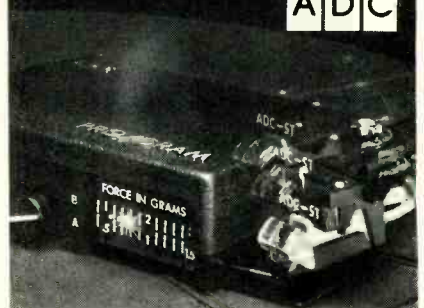
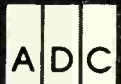
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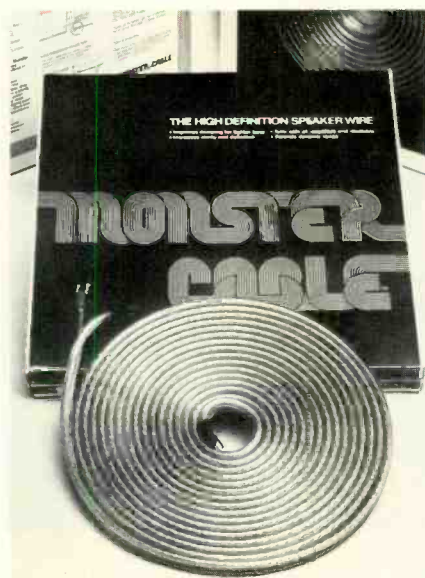
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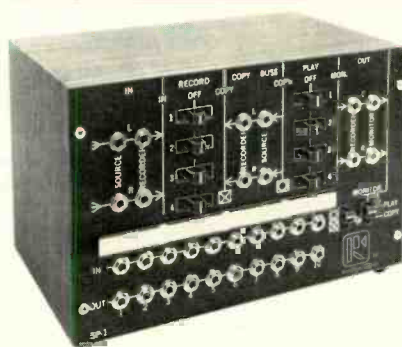
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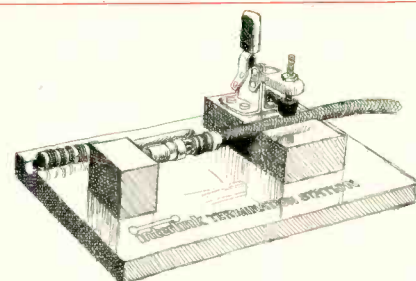
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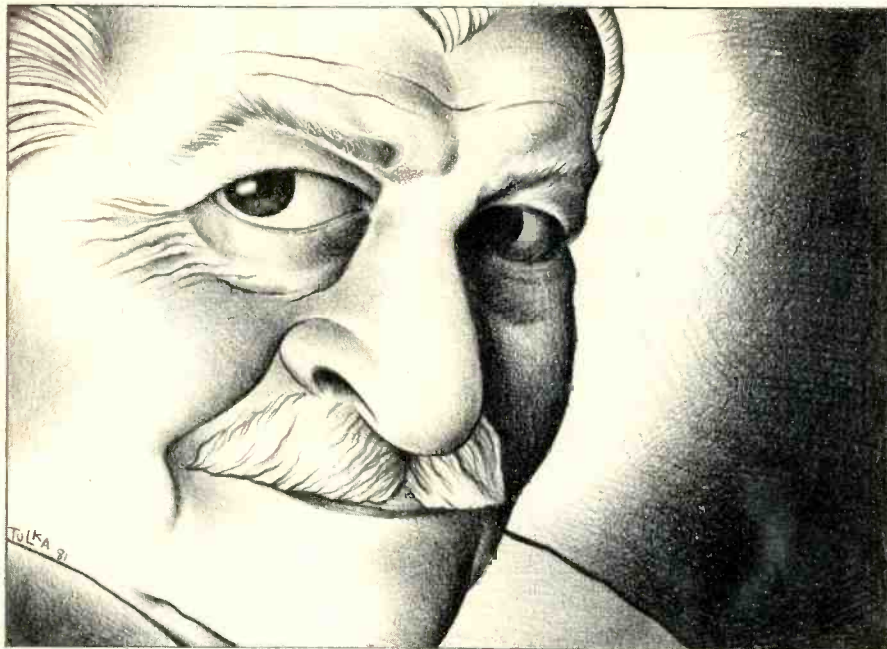
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EDWARD TATNALL CANBY



**The Digital Fiedler.** (Tchaikovsky: Capriccio Italien. Rimsky-Korsakov: Capriccio Espagnol.) Boston Pops, Arthur Fiedler.

**Platinum PS 1021**, dbx encoded, stereo, \$18.00.

Sound: A Recording: A Surfaces: ?

We now may bow gracefully to honor this Bert Whyte recording, which becomes the first classical digital to be made in this country. It was made in October of 1977 but not then released in digital form. Telarc's first digital, made a few months later on the same Soundstream recorder, got the honor when it was released later in 1978.

There is thus some confusion as to "firsts." The Japanese, of course, were there long before with Denon, but let that pass. This Boston Pops session with Fiedler was done in triplicate, standard analog tape, digital tape and direct-to-disc, but only the d-to-d version was released for sale. Such is the power of the current favorite technique! Everybody was into direct-to-disc at that time, yet nobody much had heard about digital. So Bert had to wait. Telarc's disc was first. Now, retroactively, *The Digital Fiedler* becomes Number One and in a dbx-encoded version, and providing the full dynamic range of the original tape. 'Bout time.

The old Fiedler persuasiveness is apparent as usual in these two "war horses" of popular classical, and B. Whyte did indeed get down the special ambience of Symphony Hall in Boston. I can recognize it. Very pure and rather distant sound, right in the Pops tradition.

Note that dbx distributes the encoded discs and assigns a special record number which, alas, is mostly not on the coded discs themselves. They also issue a periodic catalog of the encoded records, which are available through their dealers and certain other record outlets, as well as from the firm itself.

**Clinician Series — Thomas Brown, Afro-Latin Percussion.**

**Golden Crest CR 1015**, stereo, \$9.98.

Sound: B Recording: B- Surfaces: A

Here's one of those unlikely marvels, a record that looks to be merely specialist stuff for teaching, yet which turns out to be excellent entertainment for almost any listener. I am certainly no Afro-American percussion player yet I was fascinated, for two sides! You never know.

The reason is simple. An excellent, very verbal, young teacher who stands up before mikes and a batch of performers and *improvises* his explanations, enthusiastically, followed by musical exam-

ples to show what he means. No stolid announcer type here, orating with perfect diction and no trace of intelligence — the usual for such instruction recordings. This guy gives, and gives persuasively, everything he has. Which is plenty.

Being spontaneous, there are a few irregularities in the recording, mainly the rather hasty level adjustments necessary when the instruments play. But they are well done, even so, and will not bother you a bit. Absolutely fascinating for the would-be Latin-style performer. Entertainment for the rest of us.

**Holst: Suites Nos. 1 and 2 for Winds; Hammersmith. Vaughan Williams: English Folk Song Suite; Toccata Marziale for Military Band.** London Wind Orch., Denis Wick.

**Nonesuch N-78002**, stereo, \$8.98.

Sound: B+ Recording: B- Surfaces: B

This band record duplicates two of the items on Telarc's well-remembered first digital disc, the pair of Holst Suites, and offers more Holst and a couple of Vaughan Williams items as well. For Holst, I much prefer Telarc. And the other Holst and V-W pieces here tend to sound pretty dated these days, for all their folk-song content.

The sound, compared to Telarc, is rather distant and somewhat low in level, as the ear senses it, without enough fullness and roundness of perspective. And the band plays fast and a bit nervously. Not the sort of thing that invites frequent repetition. The original recording is from Enigma in England, which has some pretty hot stuff in the hi-fi line. Not this one, for my ears, though.

**Vivaldi: Violin Concertos Op. 8, Nos. 5-10.** Simon Standage; The English Concert, Pinnock.

**Vanguard VSD 71273**, stereo, \$7.98.

Sound: A- Recording: A- Surface: B+

Continuing the extraordinary, even revolutionary performances of the familiar "Four Seasons" (VSD 71257), Trevor Pinnock's small group of Baroque strings (i.e. built or restored to the pre-1800 configuration, minus the beefing-up that generally occurred in the early 19th century) moves on here to more of the concertos, all of them part of the col-

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lection called *Il cimento dell'Armonia e dell'Invenzione*. The concertos on this disc were until recently much more familiar than the "Four Seasons" group of four, which perhaps were thought trivial in comparison with, say, Beethoven or Richard Strauss.

In these five works there is not the dramatic scope for the astonishingly vivid portrayal of the seasons in the earlier recording. But the same lithe, accurate, quick-paced playing once more gives the lie to the old-fashioned Mack truck approach to the composer, still to be heard via some of our orchestras and conductors, not to mention famous fiddle soloists. They should know better. They should listen here.

The soloist, playing his Baroque violin, gets small billing, which is correct for the music, much less show-off (though no less difficult!) than the brash later fiddle concerto vehicles. He is excellent, if recorded rather close, but his string colleagues are right behind him and a fine acoustic space surrounds them all. The sweet, honey-colored sound of the old-

type instruments really grows on you. It is warmer, richer than the "white" sound of modern strings. And, of course, on records it is just as strong and loud. This, at last, is beginning to be the real sound of Vivaldi as the composer himself knew it to be.

**Musique Judeo-Baroque (Rossi, Saladin, Grossi).** Boston Camerata, Joel Cohen.

**Harmonia Mundi HM 1021**, stereo, \$9.95. (Mail orders, contact Brilly Imports, 155 N. San Vicente Blvd., Beverly Hills, Cal. 90211.)

Sound: A- Recording: B Surfaces: B+

If you ignore the title and bypass the words, you will simply hear on this record some excellent early Baroque music, post-Monteverdi, with chorus, some solos and a group of authentic instruments of the time. These are 17th-century Jewish composers, setting Hebrew texts for religious usage — but in those times it did not occur to them to

write "Hebrew" music; music was music, just as autos are autos today, and it was produced as a matter of course in the current local fashion. Jews were in exceptionally high favor in northern Italy in this period, and Salamone (Solomon) Rossi led a good life and published his music as a leading composer.

In this Boston performance, licensed to France and reimported, the works are nicely done by a group of young voices, college type, who sing with accuracy, verve and a commendable lack of vibrato. In spite of somewhat blurring acoustics the Hebrew texts come through. Occasional solo voices are light and in perspective. Curiously, the chorus is better than the instrumentalists, who often play interludes in the manner of Monteverdi. Minus words, their phrasing and rhythm plod along with an unsprightly effect that does not at all match the vocal liveliness. The Hebrew, to be sure, is well set! It sets up its own dynamic rhythms. The recorded balance puts the chorus too far away, but it comes through, even so.

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STEREO REVIEW June, 1978.  
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Chuck Mangione's album "Tarantella" is available on A&M records and tapes.

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**YAMAHA**



# A Christmas gift of music, long ago.

I cannot say how much of my life I spent listening to phonographs, but the most unforgettable of these many hours came on Christmas Eve some 41 years ago. I was then in my late teens and, being racially obnoxious to Hitler's government, I had become a fugitive and outlaw and had to be hidden. In a remote village in the Tatra Mountains I found shelter, for a fee, in the house of an elderly grain dealer. He loosely supported the local Resistance movement, but firmly hated Hitler. So he could be trusted.

In happier days he had sold his produce at the commodities exchange in Brno, gone to the opera there, and fallen under the spell of music. In consequence, he owned one of the few radios to be found at the time in the uplands of Slovakia, where even plumbing was rare and water had to be fetched from a pump. Since the village had no electricity, the radio ran on batteries and reception was erratic. But when the weather was right, my host told me, he used to be able to hear concerts from Prague, relayed by the transmitter at Kosice.

The radio was silent now. Batteries, along with almost anything else, were unavailable in wartime. Besides, the government frowned on private ownership of radios, preferring to entertain the pop-

ulace with loudspeaker trucks parked in the village square, which blared out martial music interspersed with triumphant news of German victories from Norway to Greece. In fact as in its songs, the Third Reich proclaimed dominions over the earth.

But beyond earshot of the sound trucks, our village rested in stillness broken only by the occasional lowing of a cow. Yet, we knew the world was turbulent and terrible, that the stillness would end and we, too, would be engulfed in the nightmare.

It didn't matter about the batteries because my host was no longer in the mood for music. His business had collapsed when the Germans confiscated the crops and there was no grain to sell. His wife was dead and his son, with a snug job in the Nazi-sponsored bureaucracy at Bratislava, had nothing to say to him. Much of the day he sat in an elaborately carved high-backed chair — a relic of bygone opulence — and stared at the wall. I kept out of his way and busied myself in the garden, pruning trees or — for some perverse pleasure — beheading snails, or worked my way systematically through an old German encyclopedia I found on his shelves. Europe raced in the maelstrom. History tumbled in its cataclysm. For us, the hours didn't move. Time had stopped.

The two of us lived in the house that

My host asked me what I would like for Christmas. I said I would like to hear some music.

way for several months. A peasant woman came to cook and clean. Her son was with the partisans, so she wouldn't betray me either. She spoke no German, so I couldn't talk with her. And, of course, I could not go out. I had no legal existence and hence no right to live. To be seen was dangerous.

In the silence and solitude of my days I developed the habit of trying to hear music inside my head. I tried to reconstruct from memory the music I had so often heard at home when my father systematically acquainted me with his record collection. Those were the years when the mainstays of the repertoire were being recorded for the first time, the electric phonograph just having made it possible to capture music sound with tolerable verisimilitude. Each new release was an event in our lives. We waited eagerly for another Mozart symphony from Sir Thomas Beecham, for the next album in Weingartner's Beetho-

# The most talked-about and least understood "underground" speaker is at last in the stores.

Most audiophiles have heard of it. Not many have heard it. And only a few of these understood exactly why it sounds as good as it does. Because of the unique history of its design, the Fourier 1 speaker system became a minor legend long before it got to the stores.

It all started out in the laboratories of *The Audio Critic*, probably the most hard-nosed of the "underground" audio reviews, as a purely academic exercise to prove an editorial point. The point was that designers of conventional dynamic speaker systems hadn't been doing their homework and that proper utilization of all existing knowledge about drivers, enclosures and crossover networks could result in a simple, straightforward, affordable system that would closely rival the most extreme high-end "exotics"—electrostatic, ribbon, ionized air, motional feedback or what have you. The experimental 3-way floor-standing speaker offered as proof was eventually deemed too good to remain a laboratory curiosity; a new company was formed under the name of Fourier Systems; and after many months of planning, groundwork and rumors the Fourier 1 was launched.

Those who have heard the Fourier 1 agree almost unanimously that it sounds significantly superior to all other floor-standing electrodynamic systems, American or English, up to twice or even three times its price, which is \$1325 the pair. "World's best box speaker" is one typical comment. "Sounds like a really good electrostatic" is another. What seems to be the most misunderstood aspect of the design is that it isn't really a "technological breakthrough" but rather a rejection of traditional engineering errors, misconceptions and ineptitudes.

Specifically, the Fourier 1 is the only speaker that can truthfully make the following three claims all at once: (1) undistorted *large-signal* response down to 32 Hz out of a floor-standing column only a little over three feet tall; (2) very high efficiency combined with almost unlimited power handling, so that 25 clean watts will make it play loud, but with 250 watts it just gets better; and (3) delicate transparency despite all that brawn and guts. On organ pedals and symphonic climaxes, when other highly regarded speakers begin to go crunch, the Fourier 1 is still rock-solid and musical.

And now that you're aware of all this, what other speaker are you planning to buy?

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ven cycle, and for Bruno Walter's Brahms. We discovered the existence of faraway places like Boston and Philadelphia through the recordings of Serge Koussevitsky and Leopold Stokowski and marveled at the magnificent performances of Toscanini in New York. Those evenings with the phonograph, back home, had been my happiest times, sharing in concentrated attention the experience of music with my father, who soon afterward vanished forever in the Gestapo dragnet during the invasion of Austria.

Now, in the little Slovak village, I was trying to put together pieces of remembered music like a jigsaw puzzle. Often they didn't fit. Bits of Schubert's Trout would get right into the middle of a Rasumovsky quartet. And sometimes the music would simply break off. I couldn't remember the rest.

**T**his frightened me and made me desperate. For, without realizing it at the time, I must have harbored the notion that if I could put all the music I had heard at home back together in my head, in one seamless continuity, my father would come back. I suppose that is why I felt that the whole world was going to come right, after all, when I discovered that I could—in my mind—get through the Meistersinger prelude all the way from beginning to end.

It was easier in the summer when I could be in the garden. But the cold weather comes early in the mountains, and indoors it was harder to think of the tunes. It was as if the low ceilings and thick walls, the meager windows and prevalent gloom of the house had quenched the music of my imagination, and I knew it could be rekindled only by hearing real music once again. Without the music, I too began to despair—to lose the links between one day and the next. I no longer sensed the connection between where I was and the days with my father.

By November everything had grown dark. The mists rarely lifted. The towering bulk of the High Tatras kept the low sun out of our valley. You couldn't see inside the house by mid-afternoon. We had no petroleum for the lamps and insufficient candles.

The approaching winter also darkened our lives in other ways. The Germans had taken the cows when they were driven back down from their mountain pastures after the first frost; so, there was even less to eat. More soldiers loitered about after Slovakia opened its roads to the German army, allowing access to the oilfields in nearby Rumania. Occasionally, we saw a black Mercedes

carrying black-clad men with silver skulls on their caps—the SS. In a neighboring town, we were told, the Germans had taken away all members of the Resistance and their families. Their names, the peasant woman said, had been betrayed by someone under torture. The loudspeakers in the square told of Hitler's new friendship with Japan and boasted of the burning of London. The horror now spanned the globe, and our valley was a trap.

Later in the year, my host asked me what I would like for Christmas. I am not sure he liked me much, but he was a kind man. I said I would like to hear some music.

I said it almost without thinking, but my eyes shifted to the radio. Perhaps, without being aware of it, I hoped that my host's well-connected son might use his influence to get a set of batteries in Bratislava. But I certainly never would have suggested this. The old grain dealer just nodded.

We had no Christmas tree. On December 24, the peasant woman brought several boughs of fir and we lit some extra candles. I thought of midnight mass in the village church. The organ would be playing. I trembled at the imagined sound of the big bass pipes, the fullness of the great chords, and the miracle of melody rising from it all. But I could not go to church. It was too risky to be seen, especially now that there were so many more Germans in the district.

**S**till, I had my Christmas wish. On the table in the dining room, on the thick ochre rug that usually covered it between meals, stood an ancient and rather ramshackle phonograph. But its brass horn was freshly polished and the tattered green felt covering the turntable was more or less sewn together. The old man had remembered the phonograph, fetched it from the rumpus room, and the peasant woman had helped him fix it up. It hadn't been used since they began broadcasting music from Kosice. The radio sounded better, he said. But he still had some records and even a box of needles.

So, on Christmas Eve, 1940, I listened to Fritz Kreisler play the Beethoven violin concerto with the orchestra of the Berlin State Opera conducted by Leo Blech. I have no recollection how it sounded. But I remember having to wind up the phonograph after each side—10 times in all. Curiously, this was no real interruption of the music. On the contrary, it was as if the music swelled to boundless force in those intervals. As I turned the crank, it set in motion engines of war all over the world that threw back and cut down the armies of the enemy. **A**



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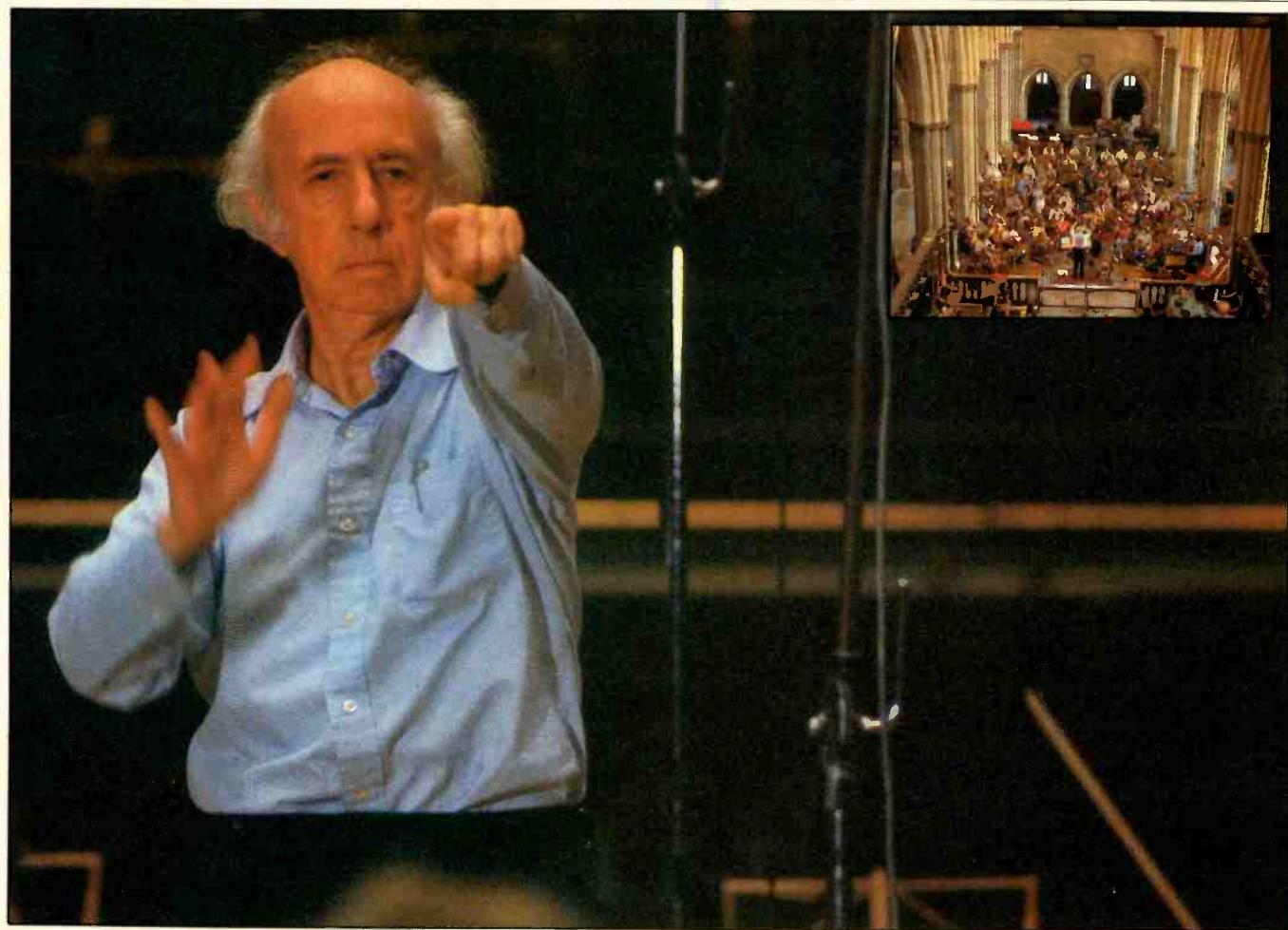
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**ONKYO**

# MORTON GOULD

GARY STOCK



**T**o the student of contemporary American music, the name and works of Morton Gould need little introduction. He stands as one of the nation's foremost composers, not only because of his symphonic works, but also because of the eclectic body of popular music—pieces for film, ballet, Broadway, and television — which he has written.

From the first flush of national popularity acquired through his Depression-era radio broadcasts, Gould has explored an ever-widening array of musical

forms. He developed the concept of the "little symphony" in his well-known symphonettes, examined jazz forms in "Interplay," contributed to what might be called American patriotic music with "American Ballads," "Columbia," and "American Salute," and composed ballet scores for artists like de Mille ("Fall River Legend"), Balanchine ("Clarinade"), and Eliot Feld ("Santa Fe Saga"). His film music includes scores for "Windjammer," "Holiday," and "Delightfully Dangerous," and his Broadway works include scores for "Bil-

lion Dollar Baby" and "Arms and the Girl." He composed the theme music for the NBC production "Holocaust" and for ABC's "F. Scott Fitzgerald in Hollywood," among other TV works.

As a conductor and recording artist, Gould has been no less active. His RCA recordings of the music of Ives and Nielsen were strong influences on the growing popularity of these composers in the U.S.; he won a Grammy award for an RCA Red Seal recording of Ives' music with the Chicago Symphony in 1966. In recent years, his intimate interest in re-

## A noted composer talks about his perceptions of high-technology recording

*Recording with the highest possible sonic quality led him to both direct-disc and digitally based records with the London Symphony and London Philharmonic Orchestras. These recordings, on the Chalfont and Varese/Sarabande labels, have made him familiar with the new technologies of digital recording and dbx-encoded discs. We visited Gould in his home on Long Island to talk about his reactions to recent developments in recording techniques.*

**A**udio: You've been exposed in the course of your career to many technical advancements in sound. In fact, you've always been noted as a composer who has taken an interest in the technical side of broadcasting and recording. Of all the incremental improvements in sound that came along during your career, which was the most dramatic and large-scale?

**MG:** The biggest advance was the LP. For my kind of music—which I suppose might be called symphonic music for want of a better term—the ability to do a symphonic work without having to stop after four minutes or so was a major breakthrough. There used to be a 12-inch shellac, which ran four minutes and some seconds, and then a 10-inch shellac, which ran three minutes and something. Even if you did a movement that ran only eight minutes, you had to break it into two segments. If it ran 10 minutes, you had to decide what to do with the remainder of the record. To say nothing of the improvement in sound, the idea of a record that could contain as much music as an LP was a complete revelation.

**Audio:** How much music of the pre-LP era was composed specifically to fit the 78 format? Do you think the musical compositions were substantially affected by the time limitations?

**MG:** In the commercial sphere, a lot of things were affected. When I was making so many recordings of my arrangements of popular show tunes, they were obviously made to fit on a record side;

they just could not run more than one side and be effective. I did many, many years of radio broadcasting, and in radio you rarely ran a piece more than four minutes, because in a half-hour program you wanted to do seven or eight numbers. The recording time affected many such things. What it did not affect was the serious composer who was going to write a symphony or symphonic work; however long it ran, that was it, because it was intended primarily for concert performance. The recording was simply an after-the-fact event. When you recorded it, it was your responsibility as conductor to look at the score and choose the first feasible break around the four-minute mark. Then you would attempt to stop, start again, and pick up the music.

**Audio:** What was the advancement that did the most to give music vibrance and "life," however?

**MG:** That came with the whole era of high fidelity, the accent on an increased consciousness of sound, which again was tied strongly to the advent of the LP. This was coupled with the whole idea—also new at that time—of putting music on tape, as against the wax, and the idea that you could edit. When we did 78s, of course, that performance was it, and if there was a mistake there was no way of retrieving it.

**Audio:** How did the radical improvements in sound change the way you went about arranging music? For example, how did you react to the presence of wider dynamic range?

**MG:** The wider dynamic range made possible what might be called an expanded palette of musical colors. People could go for effects, for impact, where before it had not been possible. In the performances of individual players, you could get a wider latitude of dynamics.

**Audio:** With tape, did you find that performers were generally willing to take more chances?

**MG:** Yes, I think so. When we were doing the 78s, we all had to be careful, since there was no way to correct, while

with tape you might try certain dynamics—play something louder than you were supposed to—and see if you got it on tape. You might have it on tape, too, but then not be able to make the transfer to the final disc; a certain amount of tempering was inevitable there. But at least you could try for the effect, and then if the tape or the groove broke up, do it over again or temper the transfer.

**Audio:** Did most composers and conductors in the early days of high fidelity take advantage of this expanded dynamic palette fully, or was it left more or less unused for a while?

**MG:** It took some time for people to catch up to it. You have to remember that a lot of people who recorded in those days were not particularly sensitive to the recording medium. Many of my colleagues would make comments and even write articles about how terrible recorded music was—that it was all artificial, and presented an aesthetically distorted view of music. Many performing artists wanted nothing to do with recordings. Others were allergic to the recording environment, and had to be almost pulled forcibly into the studio. There were some clear exceptions to this of course; Stokowski was doing stereo back in the Thirties. He was really a pioneer, very sound conscious.

**Audio:** That has also historically been said about you.

**MG:** Well, I think I was among those aware of it, and therefore perhaps part of the process of development. The opposition of many early performers to recording stemmed from the distortion of musical values in their eyes, rather than the technical shortcomings—though the two are of course related. An artist used to playing a tremendous fortissimo would go into a recording studio and be told "Now look, don't play it too loud." And he would begin to play a real pianissimo and be told "No, that's too soft." There developed in the first years of sound recording a breed known as the "recording artist." I was one of them.

**Today every artist is primarily a recording artist — we know them long before we see them perform live.**

We were people who, because of our styles or our chemistry, could adapt to the peculiarities and tensions of recording without being too thrown. Many artists unused to studios would go to pieces when that red light went on. As nervous as one might get in a concert hall, it was in a sense transient. You would leave; the music would be gone — whereas in a recording an artist could put something down and for many years afterward somebody could listen to it and comment on its faults. There were all sorts of factors that stood in the way of the performing artist relating to the recording medium. Today every great artist is primarily a recording artist. We often know of artists long before we see them live, through their recordings. Long ago it was just the opposite.

The reason for this change is, of course, the whole technological area, and the constant striving for improvement, up to the digital and dbx recordings I've worked with recently — which

are also radical breakthroughs. Throughout my career, the problem with recording has been that it was always a mechanical medium, with its own noises, problems, and limitations. Bit by bit, the technology has widened the limits and slowly overcome the aesthetic frustrations that existed.

**Audio:** You're perhaps the ideal man to ask this of, Maestro Gould. There is a fair amount of debate now as to how much digital recording colors music. Some claim that it inherently sounds false; they say that the music world is having technology for technology's sake shoved down its throat. What is your view? Do you hear intrinsic faults in digital recordings?

**MG:** Frankly, I wasn't aware that there was this sort of belligerence against digital recording. While I'm not fully up-to-date on all of the different techniques and processes used in recording, I think that digital recording is a very important breakthrough and expansion of record-

ing possibilities.

**Audio:** As big as stereo, or the LP?

**MG:** I would say so. In evaluating a recording's quality of sound, you must bear in mind that you have to start with what we might call a good set-up. The sound will depend on so many factors related to the set-up, no matter what kind of recording mechanism is used. It depends on the studio; it depends on the conductor; it depends on the A&R [Artist & Repertoire] man; it depends on the engineer; it depends on the weather; it depends on so many, many factors. All recordings are affected by these things, and that includes digital as well. There is no system that can automatically guarantee a first-rate recording and a good performance. You must have the appropriate ambience in the studio — especially when you're talking about big orchestra recording such as I've been involved in. You must have an engineer and technical staff who are sensitive enough to handle the orchestra's sound.

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**Any expansion of the ability to convey the color of music will ultimately be to the good.**

You have to have the right microphones, and the right microphone positioning. You have to have a balanced orchestra; you can have a brilliant recording but an orchestra that is imbalanced within itself, or even a good orchestra that just doesn't have a good whole sound. Or you can have a great orchestra and a conductor who is not sensitive and thus unable to project a performance in the studio with no audience. Assuming that all of these are pluses, and everybody knows what they are doing, digital recording allows for a range and power that didn't exist before.

**Audio:** Even as compared with the best of conventional analog recording equipment?

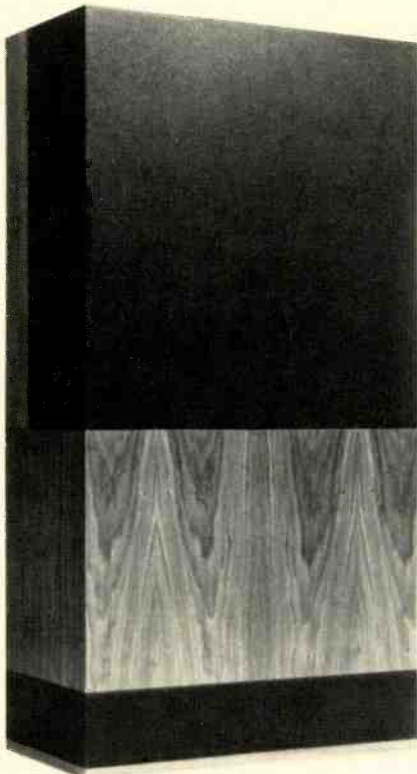
**MG:** I would say so. Even most of the great analog recordings were basically illusions. With conventional recordings, you would say to the percussionists "It should sound like double forte but don't play louder than mezzo forte." You tried to give the illusion of a double forte, and

of a pianissimo, but you could never really do either as they were done in a concert hall. These were all things one learned to cope with. Back in the days when virtuoso studio orchestras were assembled, they would be made up of players who knew these things. You looked at them at the appropriate moment and they knew that they had to pull back, or to play out more. When I recorded with the London Symphony using digital equipment, though, I had to first tell the percussion players to play out, not be afraid of a sforzando or a forte. At first they looked at me as if I had two heads. They were one of the great recording orchestras of the world, yet they had never before been able to do this. From what I know now — unless there are things I haven't heard or don't know yet — digital recording is a tremendous progressive step.

**Audio:** Given the availability of digital and dbx techniques, among others, how do you think the musical compositions

and arrangements of the future will be affected?

**MG:** The clearer the sonic air—and one might use that image—the more signal that can be heard and the more subtlety that can be found in the music. This cuts two ways, of course. We will certainly expose more frailties with better recordings, and where a slightly inept phrase or a passage with bad intonation might not be too evident on a record with a degree of extracurricular noise, with a better recording it will suddenly be exposed. The development of digital and of dbx—which to my experience is also a tremendous contribution to pure sound—will open up a still wider palette of not only primary colors but also intermediate and inner colors, and subtle gradations of color. Any expansion of the ability to convey the color of music through the orchestral palette will ultimately be to the good. It makes us all the beneficiaries of the rich sounds that go up to make music. A



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*“I purchased the Snell Speakers to replace Magnapan MG-IIs. I am very pleased with the openness, depth and smooth response — greater range than the ‘pans’.”*

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# 1

## PIONEER A-9 INTEGRATED AMPLIFIER

### Manufacturer's Specifications

#### Power Amplifier Section

**Power Output:** 110 watts per channel, 8 ohms, 20 Hz to 20 kHz.

**Rated THD:** 0.003 percent.

**SMPTE IM:** 0.005 percent.

**Damping Factor:** 60.

#### Preamplifier and Control Sections

##### Input Sensitivity for Rated Output:

Phono MM/MC, 2.5/0.1 mV; high level, 150 mV.

**Phono Overload, MM/MC:** 250/10 mV.

**Frequency Response:** Phono RIAA,  $\pm 0.2$  dB; high level, 5 Hz to 200 kHz, +0, -3 dB.

**Tone Control Range:** Bass,  $\pm 10$  dB at 100 or 50 Hz, turnover frequencies at

400 and 200 Hz; treble,  $\pm 10$  dB at 10 and 20 kHz, turnover frequencies at 2.5 and 5.0 kHz.

**Subsonic Filter Cutoff:** 20 Hz, 12 dB/octave.

**S/N, A Weighted, Re Rated Output:** Phono MM/MC, 90/74 dB; high level, 110 dB.

**Muting:** -20 dB.

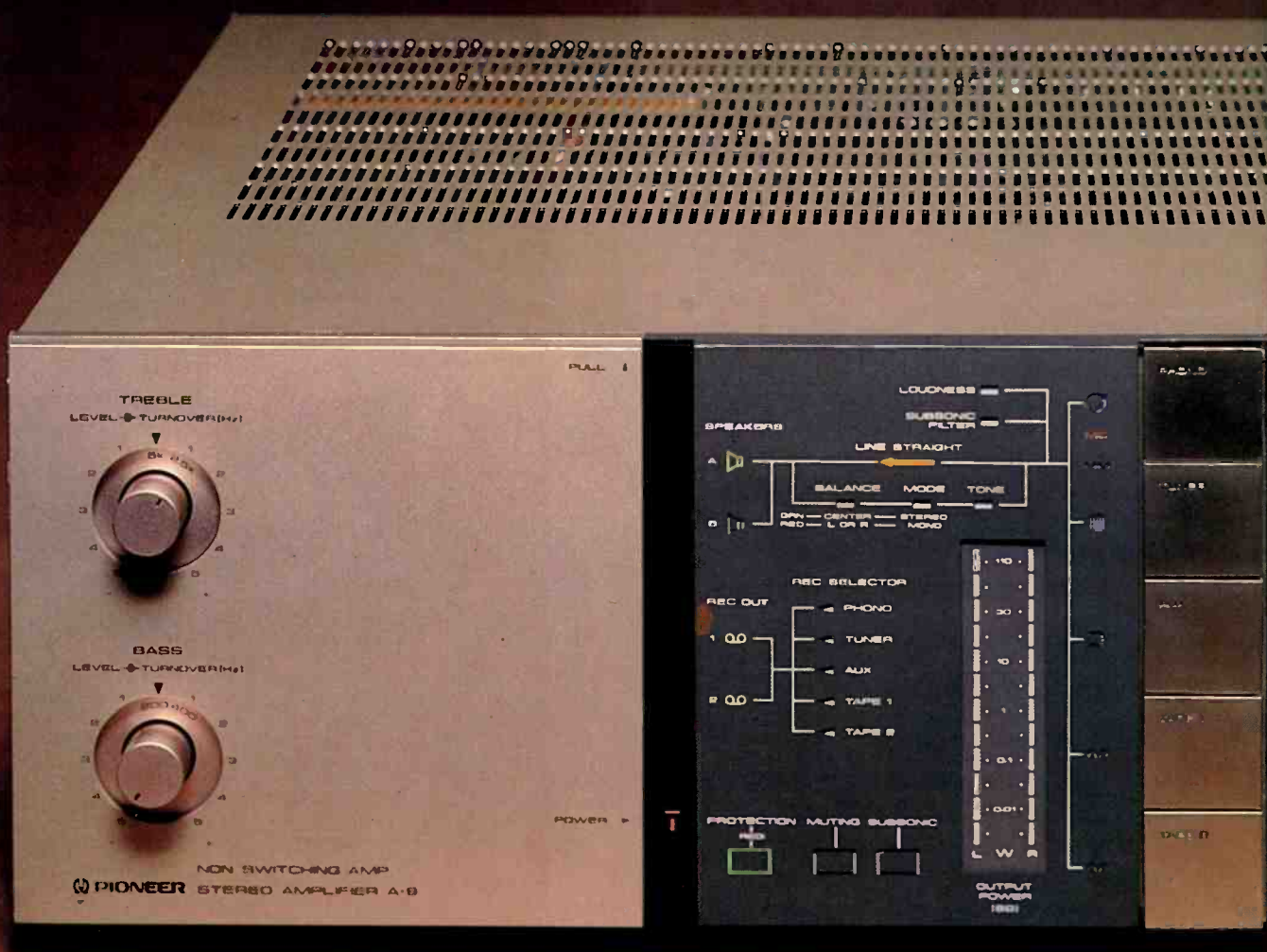
#### General Specifications

**Power Requirements:** 120 V, 60 Hz, 350 watts.

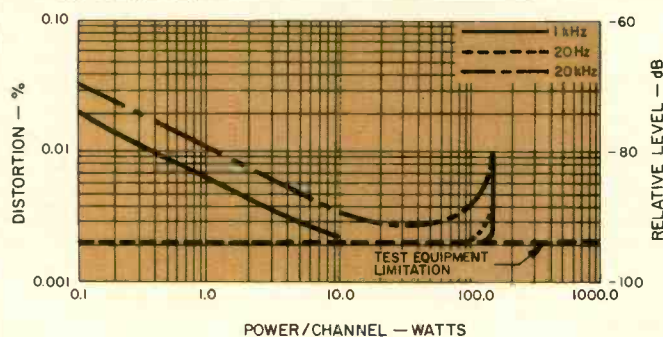
**Dimensions:** 16-9/16 in. (42.07 cm) W x 5-15/16 in. (15.08 cm) H x 16-15/16 in. (43.02 cm) D.

**Weight:** 35 1/4 lb. (15.86 kg).

**Price:** \$800.00.







**Fig. 1—Power output vs. THD, Pioneer A-9 amplifier.**

Besides its brand-new cosmetics (which represents a radical departure from their earlier components), there's a great deal that's new and different about Pioneer's top-of-the-line A-9 integrated amplifier. For one thing, the company has come up with its own dynamic bias system which they call a Non-Switching Amplifier system. Moreover, the power amplifier section as well as the equalizer amplifier are both equipped with a d.c. servo circuit which permits the elimination of all coupling capacitors in the signal path while maintaining drift-free d.c. stability. Other operational and circuit features will become apparent as we review the layout of the front panel of this sleek-looking amp.

The front panel is divided into three sections. A large calibrated master volume control, -20 dB muting switch, stereo phone jack, and a vertical row of program selector touch-button switches are all located on the right-most third of the panel. The center third incorporates a series of light indicators and pictographs which clearly tell the user what source has been selected, which speakers have been chosen, and a large variety of other indications which leave no doubt in the listener's mind as to what is taking place and what signal routings or processing have been selected. A power circuit protection indicator, also located in this area, changes from green to red depending upon the operating mode of the protection circuitry.

At first glance, the left-most third of the panel seems devoted only to a power switch and bass and treble controls, but a slight pull along the top edge of this section causes a hinged door to swing down and reveal many other hidden switches and controls. There are, for example, a channel balance control and a record selector switch which not only permits dubbing from one connected deck to another but also lets you record from one program source while listening to a completely different program. Another series of tiny push buttons selects moving-magnet or moving-coil cartridge inputs (the amplifier has a built-in pre-preamp for use with MC pickups) as well as a choice of impedances when MC cartridges are used (100 or 33 ohms) and a choice of capacitance loading values when MM cartridges are employed. The capacitance choices are 100, 200, 300 or 400 pF, and, of course, the user should first subtract cable and wiring capacitance from required total cartridge loading capacitance to determine which push button to press. This arrangement is far more useful than one which merely gives the user a choice of resistance loading values for MM cartridges. I can think of only a very few moving-magnet phono cartridges manufactured these days that require a resistive load other than 50 kilohms (actually, 47 kilohms is the value usually specified), so most makers don't bother to provide 22- and 100-kilohm options. The capacitance options, however, make a lot more sense as they provide an opportunity for more nearly correct cartridge optimization. The loudness switch, subsonic filter switch, speaker selector buttons, and tone-control turnover frequency selector knob are all located behind the swing-down door as well. In short, Pioneer has actually accomplished what so many component makers claim to have done: Prominent display of most often used controls and neat hiding of those controls which are needed less frequently. An additional pair of novel controls located behind the door panel and in the display area to the right are a "line straight off" switch which bypasses the tone controls, the balance control, and the stereo/mono mode selector completely, and a subsonic detection indicator which lights when ultra-low-frequency noise components are generated by



## The new panel layout of the Pioneer A-9 amp contributes a great deal to its ease of use.

record warp or other noise sources. The indicator warns the user when to employ the subsonic filter.

The display area of the front panel also features a pair of vertically oriented LED power output displays calibrated with reference to wattage across 8-ohm loads. The entire panel layout is, in my opinion, one of the most innovative and practical that any amplifier manufacturer has yet devised. It is rare that such a radical departure from the "traditional" front-panel look should gain immediate or widespread approval, but just about everyone who has passed through my laboratory since the model has been on the bench and in the listening room has commented enthusiastically about it. This new "Pioneer Look," by the way, extends to many receivers and amplifiers in the company's new line of stereo components.

### Circuit Highlights

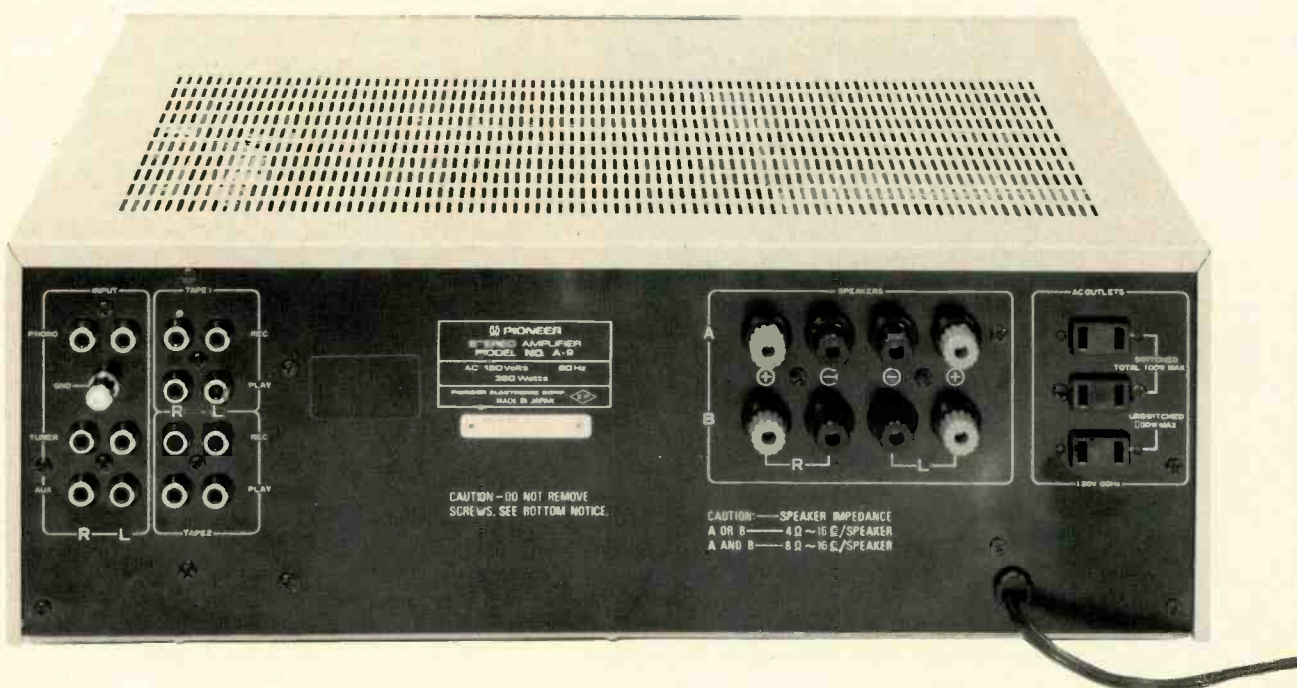
The dynamic bias system used in the A-9 is called Vari-Bias by Pioneer, and this circuit continuously monitors the amplitude of incoming signals and automatically raises or lowers the amount of bias current fed to the output transistors via a high-speed servo system. The transistors are never allowed to be completely cut off, and so there is no switching distortion. The output transistors used are ring emitter transistors. Inside each such transistor are hundreds of low-power transistors connected in parallel, with their emitter electrodes arranged in a ring (hence the name). Ring emitter transistors have a very high transition frequency ( $f_t$ ), and they exhibit high linearity even when high-amplitude input signals are applied. The A-9 uses four of these transistors per channel.

The A-9 also features an op-amp d.c. servo circuit in the power amp section, which therefore requires no input coupling capacitors or feedback circuit capacitors. The pre-driver section of the d.c. servo power amp employs a current mirror differential circuit for reduced distortion and increased stability. The driver section features a cascode bootstrapping circuit that improves transistor linearity, which helps to lower distortion at high frequencies. The phono equalizer of this amplifier is also built around a d.c. servo circuit using a low-noise op-amp. Thus, a signal from the cartridge onward to the loudspeakers does not encounter a single coupling capacitor.

### Measurements

The A-9 power amplifier section delivered up to 132 watts per channel into 8-ohm loads before I began to measure any meaningful levels of distortion. In fact, as you can see from the graphs of Fig. 1, most of the distortion plots are masked by the lower limits of the test equipment (with its 0.002 percent of residual harmonic distortion) and by residual noise of the amplifier and test instruments at the lower power output levels shown in the graphs. Bear in mind that in trying to read distortion percentages of 0.003 percent with respect to 100-watt output levels, we are talking about dynamic range capabilities of 90 dB. If you try reading the same distortion levels referenced to 1 watt, the dynamic range, still referred to 100 watts, becomes 20 dB greater or in excess of 110 dB! That's not too easy to do, even if a spectrum analyzer is imposed in the measurement system.

I was able to read damping factors of greater than 100 for a 50-Hz test signal referred to 8-ohm loads. I can also tell you that

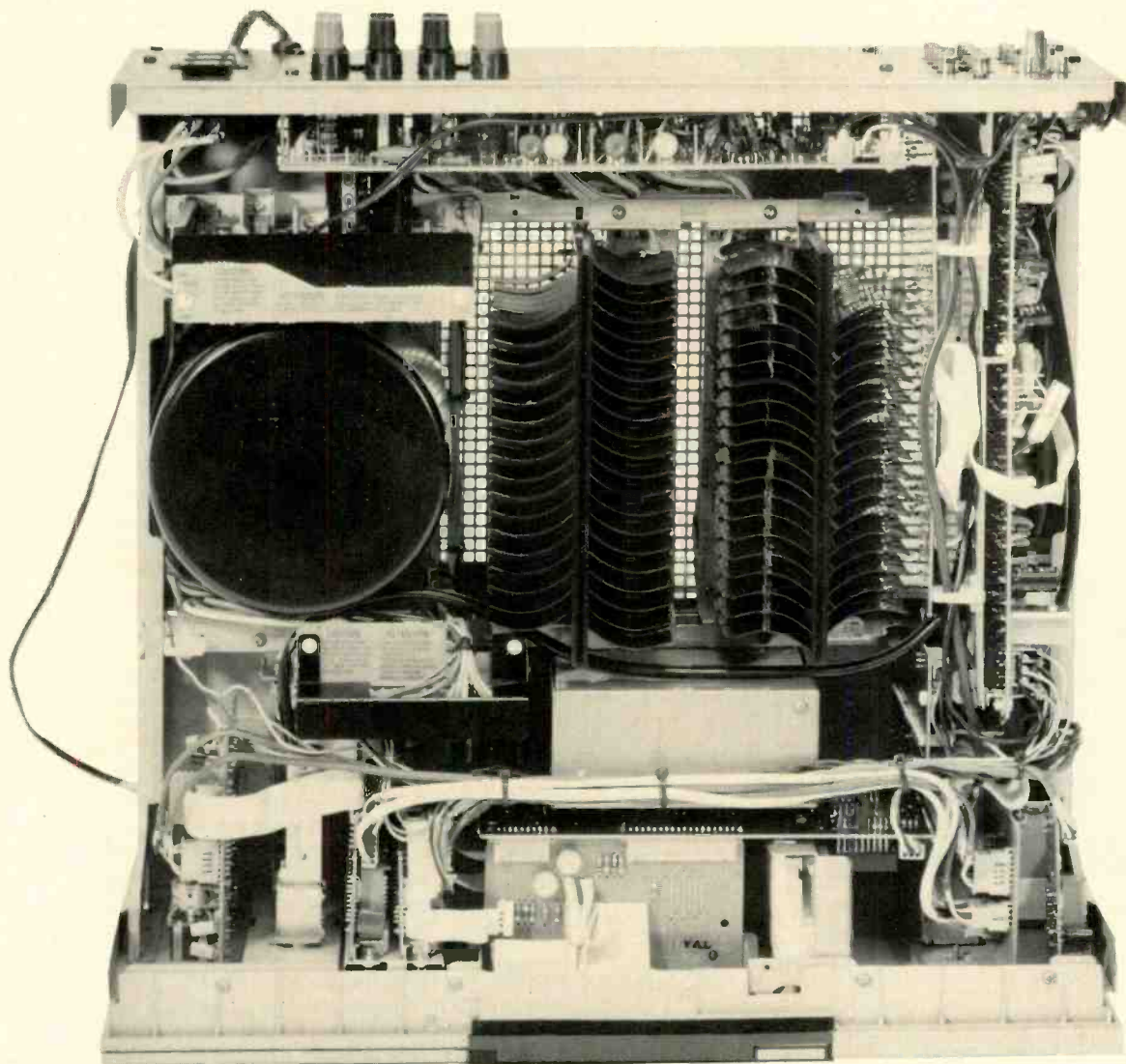


The sound quality of the A-9 was excellent. The amp handled the most complex transients effortlessly.

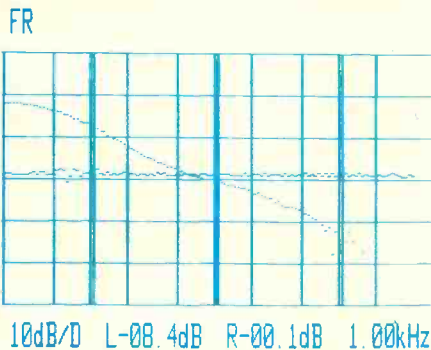
SMPTE IM began to rise when the amplifier was delivering a full 145 watts per channel. Dynamic headroom measured 1.5 dB. IHF IM was unmeasurable, even using all of the lab tricks at my command; the instrumentation was simply not sensitive enough. Using a twin-tone measurement system (with tones 1 kHz apart at around 14 and 15 kHz), I measured a CCIF IM figure of 0.0055 percent, for whatever significance that is. After all, I had to come away with some meaningful numbers for the power amp, didn't I?

Turning to the preamplifier and control sections of the A-9,

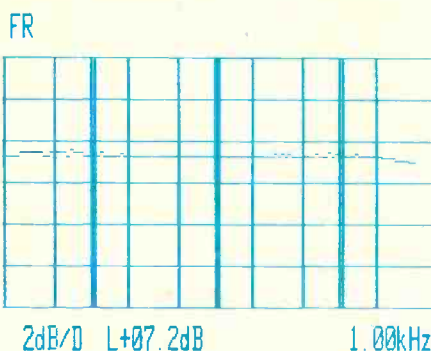
some confidence in my lab procedures was restored, for here I was able to measure the significant performance parameters of the amp. Pioneer has not yet elected to quote S/N ratios and sensitivity in accordance with the new EIA/IHF Standards, so my results will not lend themselves to ready comparisons with the manufacturer's published specs. Input sensitivity for the MM phono inputs was 0.25 mV (for 1-watt output), while for the MC inputs, it was 0.01 mV (10  $\mu$ V). High-level input sensitivity (again, referred to 1-watt output) measured 14 mV. Overload via the MM inputs occurred with an input level of 300 mV as against



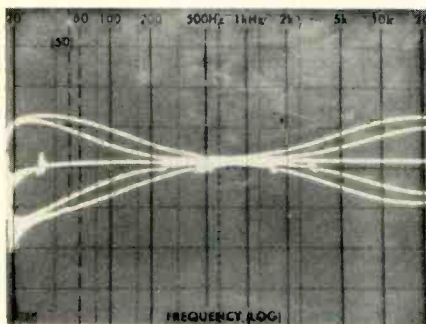
The power amplifier section delivered up to 132 watts per channel into 8-ohm loads before I measured any meaningful levels of distortion.



**Fig. 2—**RIAA playback response of equalizer section of A-9 amplifier (sloped curve) and output of preamp section when fed with inverse RIAA input signal (horizontal curve).



**Fig. 3—**RIAA response of A-9 amp was extremely flat to beyond 20 kHz, expanded scale.



**Fig. 4—**Bass and treble tone control range at each turnover setting. Plot is from 20 Hz to 20 kHz (logarithmic) and vertical scale is 10 dB per division.

250 mV claimed, and for the MC phono inputs, overload was 20 mV, or fully twice as high as the published 10 mV. Signal-to-noise ratio for the MM phono input terminals measured a very high 86 dB, while measured via the MC phono inputs, signal-to-noise was a very impressive 79 dB. It is rare indeed that I ever

measure MC signal-to-noise ratios in excess of 70 dB using the new standard method (0.5-mV input and volume control adjusted so as to produce 1 watt at the speaker outputs). Referred to 1 watt, with 0.5 volt applied at the input, high level S/N measured 88 dB, while at minimum volume, hum and noise decreased to -94 dB below 1 watt. (That's 114 dB below rated output of 110 watts, or fully 4 dB better than claimed by Pioneer.)

Frequency response via the high-level inputs was flat from 3 Hz to 80 kHz (-3 dB), while RIAA equalization via the phono inputs was virtually perfect to well above 20 kHz and down to 20 Hz. The general shape of the RIAA playback curve is shown in the sloping trace of Fig. 2; the horizontal line shows the flat output obtained via the record-out terminals when a signal having inverse RIAA characteristics was fed into the MM phono inputs. Range of sweep (performed on a Sound Technology Model 1500A microprocessor-controlled tester) extended from 20 Hz to 40 kHz. To emphasize the accuracy of the RIAA equalization provided by this amplifier, I expanded the sensitivity of the display in Fig. 3 (note the legend at the lower left, 2 dB/division as opposed to 10 dB/division in Fig. 2), and, as you can see, the response was virtually flat to well above 20 kHz.

Range of the dual turnover frequency bass and treble tone controls on the A-9 is plotted in the spectrum analyzer/scope display of Fig. 4. The advantage of having this type of tone control is at once apparent, since, using the extreme turnovers (200 Hz for the bass and 5 kHz for the treble), it becomes possible and practical to tweak the ends of the audio spectrum without affecting important midrange response. The -3dB cutoff point of the subsonic filter occurred at a frequency of 16 Hz.

#### Use and Listening Tests

The new panel layout of this Pioneer integrated amplifier contributes a great deal to its ease of use. As for the circuitry innovations inside, while I cannot honestly establish a correlation between Pioneer's "non-switching" output stages and the quality of sound that I heard, I can tell you that the sound quality of the A-9 was excellent. The amplifier handled the most complex transients that I was able to feed it with an effortlessness and openness which I have come to recognize from some of the better amplifiers produced in the last couple of years. In comparing this amplifier with others in the same price and power category, I would suggest that you audition at moderate listening levels — even low listening levels — in addition to the usual "pushing for maximum undistorted output" tests. It is at the lower test levels that you are likely to hear the more subtle differences between an amplifier such as the A-9 and lesser competition.

If the "straight line" tone control bypass feature was designed to show how much better an integrated amp can sound when signal processing or response altering circuits are bypassed, I'm afraid I was not convinced. Call it a backhanded compliment, if you wish, but I could distinguish no difference in sound quality with the "Line Straight" depressed or not depressed. Perhaps the source material I used for these tests wasn't sufficiently demanding, or perhaps this sort of comparison test is just too subtle for my ears, though I doubt it. In any case, I liked what I heard whether the tone controls were in-circuit or out, so there's no harm in having the feature for those who hear, or think they hear, a difference when they punch that switch.

Leonard Feldman

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## With great gnashing of teeth the British lords of criticism have praised a non-British turntable.

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"Wow and flutter was very good (actually this was one of the best results for a quality belt drive motor that we measured)." *Hi-Fi Choice*

"The spectrogram was one of the cleanest in the report." *Hi-Fi Choice*

"...it emerges as an excellent deck for the scrupulous user." *Gramophone*

**THORENS**<sup>®</sup>  
TD160 Super

## 2

## AUDIO-TECHNICA AT-32 CARTRIDGE and AT-650 TRANSFORMER

**AT-32 Dual Moving MicroCoil Stereo Phono Cartridge**  
**Manufacturer's Specifications**  
**Frequency Response:** 10 Hz to 24 kHz.  
**Recommended Tracking Force:** 1 to 2 grams.  
**Channel Balance:** 0.75 dB.  
**Channel Separation:** 30 dB at 1 kHz, 20 dB at 10 kHz.  
**Output at 5 cm/S:** 0.4 mV.  
**Stylus Tip:** 0.2 x 0.7 mil nude-mounted elliptical on 0.12-mm square shank, whole diamond.  
**Stylus Cantilever:** Beryllium.  
**Recommended Load Impedance:** 17 ohms.  
**Generating System:** Dual moving microcoils (inverted "V") and samarium cobalt magnet.  
**Dynamic Compliance:**  $9 \times 10^{-6}$  cm per dyne.

**Weight:** 6.8 grams.  
**Price:** \$300.00.

**AT-650 Universal Stereo Moving-Coil Matching Transformer**  
**Manufacturer's Specifications**  
**Input Impedance:** 3, 20, 40 ohms and Pass.  
**Load Impedance:** 47 kilohms.  
**Frequency Response:** 10 Hz to 100 kHz.  
**Voltage Gain:** 20 at 3 ohms, 8 at 20 ohms, 5.6 at 40 ohms.  
**THD:** Less than 0.05 percent at 1 mV.  
**Output Cable Length:** 30½ in. (77 cm).  
**Output Cable Resistance:** 0.025 ohm.  
**Dimensions:** 4.5 in. (114 mm) W x 2.6 in. (66 mm) H x 5.8 in. (148 mm) D.  
**Weight:** 31 oz. (888 grams).  
**Price:** \$250.00.



A cult seems to have formed that ascribes phenomenal music reproduction to the moving-coil phono cartridge, relegating all other types to a rather lowly status. Therefore, it comes as no surprise that the highly respected Audio-Technica company has joined the ranks of manufacturers of moving-coil phono cartridges with their superb AT-32. And, in turn, the moving-coil aficionados will probably be highly elated to read the review of yet another superb moving-coil phono cartridge — the Audio-Technica AT-32.

To overcome poor tracking, a problem common to many moving-coil cartridges, Audio-Technica has developed a new stylus assembly/coil design which minimizes moving mass at every critical point, thus permitting higher compliance without unwanted resonances. The moving "MicroCoils" are themselves extremely small, and mounted in an inverted "V" as close as possible to the cantilever fulcrum, to further reduce their effective moving mass. Because of this positioning, the mass actually presented to each record groove wall is substantially less than the mass of both coils.

Behind the coils is a vital key to the improvement of tracking ability — a unique radial damping ring that has been individually tensioned to a specific and critical compliance value. The ability to "hand tune" each individual cartridge insures optimum tracking ability at all frequencies, allowing the individual cartridge to take full advantage of the entire mass-reduction program.

The stylus cantilever is made of beryllium, one of the most rigid and least massive materials known. Its stiffness eliminates flexing which could contribute to increased distortion. Mounted on the beryllium cantilever is a factory replaceable 0.2 x 0.7 mil, nude-mounted elliptical diamond stylus with a 0.12-mm square shank. The square shank reduces mass and ensures a more accurate tip alignment with the record groove.

The body of the AT-32 consists of a bright gold-finished housing with a translucent brown plastic bottom. The stylus guard is totally removed rather than being hinged to the body. Besides the possibility of misplacing or losing the stylus guard, it became loose and had a tendency to fall from the cartridge body

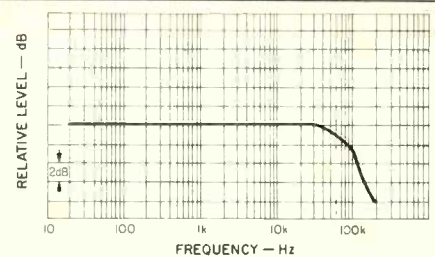
after many removals. Further, it would be helpful if the front of the cartridge had a vertical indexing line to assist in cueing as well as in adjusting the azimuth for correct vertical alignment. The AT-32 is packaged in a gold-finished, hinged, plastic case which contains the usual mounting hardware, a screwdriver, and a stylus brush. The owner's manual is thorough and one of the best I have seen.

Because of the low output voltage, the Audio-Technica AT-32 must be used with either a preamplifier's or receiver's moving-coil (MC) phono input or an out-board step-up matching transformer or pre-preamplifier. The phono cartridge is connected to the input of the pre-preamplifier or to the 20-ohm input of a matching transformer; the output of the device is then connected to the preamplifier's or receiver's magnetic phono input. If need be, the step-up can be accomplished with Audio-Technica's AT-630 or AT-650 matching transformer.

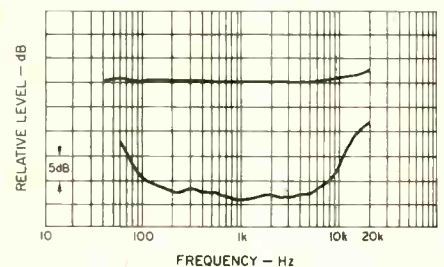
#### Measurements

The AT-32 phono cartridge was mounted in an Audio-Technica AT-S headshell and used with the Audio-Technica AT-1010 DTS tonearm mounted on a Luxman PD-555 vacuum turntable. The cartridge was oriented in the headshell and tonearm with the Dennesen Geometric Soundtracktor. Voltage step-up was accomplished with the Audio-Technica AT-650 Matching Transformer. Because the AT-650 was designed for the AT-32 phono cartridge, all measurements were made using this transformer. The transformer's frequency response was tested from 20 Hz to 200 kHz to make certain its output was flat to at least 50 kHz. The measured response was superb,  $\pm 0.25$  dB from 20 Hz to 40 kHz,  $-0.75$  dB at 50 kHz,  $-2.5$  dB at 100 kHz,  $-6$  dB at 150 kHz, and  $-8$  dB at 200 kHz. The measured gain was 27.3 dB at the 20-ohm tap, and the square-wave rise-time was  $3 \mu\text{s}$  at 1 kHz.

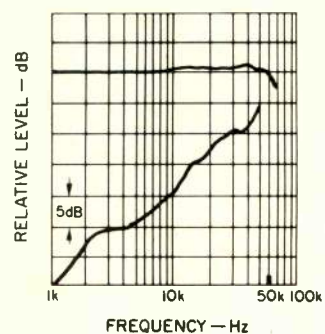
Laboratory tests were conducted at an ambient temperature of  $74^\circ \text{F} \pm 1^\circ$  ( $23.33^\circ \text{C}$ ) and a relative humidity of 56 percent,  $\pm 3$  percent. The tracking force for all reported tests was 1.9 grams (measured with a Technics Stylus Pressure Gauge, SH-50P1), with an anti-skating force of 2.0 grams. The Sound Concepts DMR-100 digital dB meter was used wherever applicable. As is our



**Fig. 1 — Frequency response of Audio-Technica's AT-650 transformer.**



**Fig. 2 — Frequency response and separation of the Audio-Technica AT-32 cartridge using the CBS STR-170 test record.**

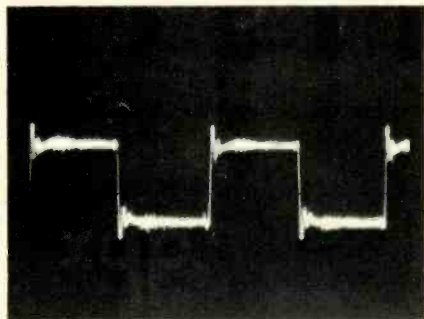


**Fig. 3 — Frequency response and separation of the AT-32 using the JVC TRS-1005 test record.**

practice, measurements were made on both channels, but only the left channel is reported unless there is a significant difference between the two channels, in which case both channels are reported for a given measurement.

Frequency response, using the Columbia STR-170 test record, was  $-0$ ,  $+1$  dB from 40 Hz to 8 kHz,  $+1.75$  dB at 10 kHz,  $+2.5$  dB at 15 kHz, and  $+3$

Listening tests showed a well-defined and tight bass, first-rate sonic clarity, and excellent transient response, especially when playing high-level discs.



**Fig. 4 — Response to 1-kHz square wave, AT-32 phono cartridge.**

dB at 20 kHz. Separation was 24.5 dB at 1 kHz, 19.5 dB at 10 kHz, 14.75 dB at 15 kHz, and 11.5 dB at 20 kHz. Using the JVC TRS-1005 test record, the frequency response was -0, +0.5 dB from 1 to 10 kHz, +1 dB at 15 kHz, +1 dB at 20 kHz, +0.75 dB at 25 kHz, +1.25 dB at 30 kHz, +1.5 dB at 40 kHz, and +0.75 dB at 50 kHz, all equal to -0, +1.5 dB from 1 to 50 kHz. Sepa-

ration was 31 dB at 1 kHz, 20.5 dB at 10 kHz, 16.5 dB at 15 kHz, 14.75 dB at 20 kHz, 11.5 dB at 30 kHz, 10.5 dB at 40 kHz, and 6.75 dB at 50 kHz. From these data it is evident that the AT-32 has a superb frequency response and an excellent high-frequency separation.

The 1-kHz square-wave response shows little overshoot followed by minimal ringing that decayed rapidly. This type of square-wave response is common with moving-coil cartridges having an extended frequency response. The cartridge-arm low-frequency lateral resonance was at 8.5 Hz at an amplitude of +3 dB; vertical resonance was 7 Hz. The high-frequency resonance was at 44 kHz, and the effective tonearm plus headshell mass was 37.23 grams.

The following test records were used in making the reported measurements: Columbia STR-170, STR-100, STR-112; Shure TTR-103, TTR-109, TTR-110, TTR-115; Deutsches Hi-Fi No. 2; JVC TRS-1005; Nippon Columbia Audio Technical Record (PCM) XL-7004; the

B & K QR-2010, and the Ortofon Direct-Cut Pickup Test Record 0001.

Wt., 6.77 g; d.c. res., 15.6 ohms; tracking force, 1.9 g; anti-skating, 2.0 g; output (using AT-650 transformer), 1.55 mV/cm/S; IM distortion: (4:1) +9 dB lateral, 200/4000 Hz, 1.15 percent; +6 dB vertical, 200/4000 Hz, 2.5 percent; crosstalk (using Shure TTR-109), 28 dB; channel balance, 1 dB; trackability: high freq. (10.8 kHz, pulsed), 30 cm/S, mid-freq. (1000 and 1500 Hz, lat. cut), 25 cm/S, low freq. (400 and 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 +8.70 dB and 43 microns (0.0043 cm), vertical at 8.12 cm/S at +3.64 dB.

The AT-32 phono cartridge played all test bands cleanly on the Shure Obstacle Course — Era III. On the Shure Obstacle Course — Era IV, the cartridge began to have some difficulty with level 4 of both the harp and flute and the flute and bells test bands, where an intermodulation type of distortion was becoming evident. In general, the AT-32 performed exceedingly well since only on rare occasions is a commercially available phonograph record cut at a velocity greater than 20 cm/S. The level 4 test bands of the harp and flute and flute and bells are recorded at velocities greater than 40 cm/S.

#### Use and Listening Tests

Listening tests were performed both before and after measurement. Without a doubt, the AT-32 is a superior phono cartridge with a well-defined and tight bass, excellent applause definition, first-rate sonic clarity, excellent transient response, and lack of detectable coloration, particularly when reproducing high recorded levels. I was especially impressed with its ability to cleanly reproduce the cannon fire on the Tchaikovsky 1812 recording (Telarc DG-10041). The excellence of the AT-32 was never more evident than when it was playing dbx-encoded records, where the record surface noise was not present to compete with the recorded music, thus making our aural evaluation of the phono cartridge that much easier. All in all, the AT-32 will have no difficulty in maintaining a position among the very top moving-coil phono cartridges. *B.V. Pisha*

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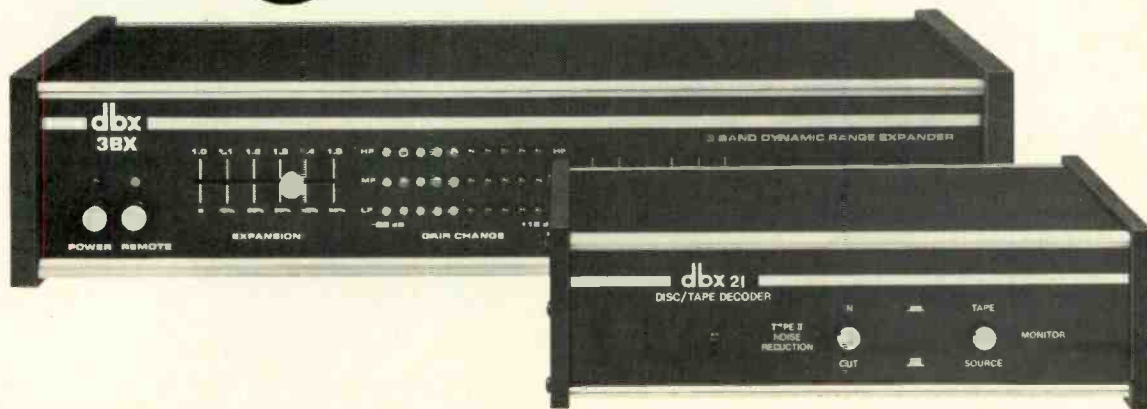
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3

## SONY PS-X800 TURNTABLE

The unit was a real delight to use, and the rumble figure was one of the lowest yet measured.



### Manufacturer's Specifications

**Speeds:** 33 1/3 and 45 rpm.

**Motor Type:** Direct-drive, linear torque, brushless and slotless.

**Wow & Flutter:** 0.025 percent W rms.

**Rumble:** 78 dB (DIN B).

**Speed Deviation:** Within 0.003 percent.

**Facilities:** Repeat, reject, record size selection.

**Arm:** Electronic Biotracer.

**Tracking Error:** ±0.05 degree.

**Dimensions:** 17 7/8 in. (44.77 cm) W x 17 7/8 in. (44.77 cm) D x 4 3/4 in. (12.06 cm) H.

**Weight:** 25 lbs. 10 oz. (11.53 kg).

**Price:** \$850.00.

Sony's Model PS-X800 is an unusually sophisticated turntable which approaches the ultimate in present-day design practice. It has a fairly conventional servo-controlled direct-drive motor but the *piece de resistance*, so to speak, is the arm itself. This is a linear tracking (SLT) design which Sony calls its "Biotracer UniMotion Tonearm," and it is controlled by no fewer than four tiny, linear-torque, brushless motors. One is used for the normal arm motion, while the second provides fast speeds; motors three and four control the vertical and lateral motion. Unlike some other SLT designs which move the arm one groove at a time, the arm on the PS-X800 moves at a constant minimum speed which, says Sony, is "calculated to be the sum of a constant value and the value which is required to reduce the stylus tracking error to zero." Magnetic sen-

sors provide the error voltages for the vertical and horizontal motors, while angular tracking errors are sensed by a Hall-effect device. Because the arm is controlled in the vertical direction, the fundamental arm resonance is reduced considerably. Tracking force is achieved by passing a current through the vertical motor, and it is determined by a calibrated control located near the front of the unit. When the arm is in its Rest position, the tracking control voltage is disconnected and the arm balanced automatically, thus ensuring that the correct tracking force will be applied. During this balancing process, the *Arm Standby* lamp is turned on.

The arm is 7 7/8 inches from pivot to stylus, but half of that length is taken up by the base extrusion and low-mass headshell. The rest is made from a rigid aluminum section measuring just under


a half-inch square. Instead of ball bearings, which can cause noise in some circumstances, the arm runs on specially designed resin bearings.

The platter drive motor is a brushless, slotless, linear (BSL) torque type, and the Magnedisc servo control circuit works in conjunction with a magnetic pickup head which derives signals from a magnetic coating on the edge of the platter. Three slots in the platter allow a photoelectric sensor to determine the size of the record so the information can be sent to the arm lowering circuit. There is also a jack which allows interface through Sony's optional RM-65 remote module to a Sony cassette deck so that recording is automatically started when the cartridge comes down. The RM-65 lists at \$25.00.

The unit comes complete with a handsome integrated dust cover which

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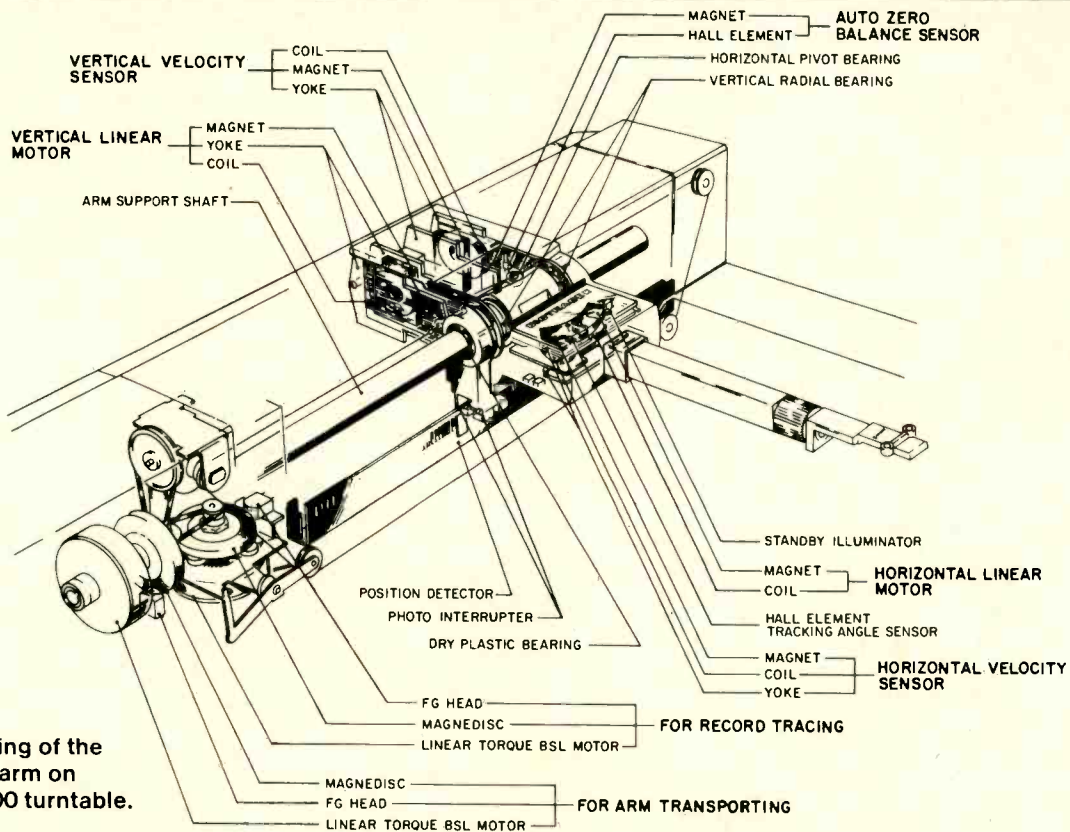
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Sony's PS-X800 is an unusually sophisticated turntable approaching the ultimate in present-day design practice.



Cutaway drawing of the Biotracer tonearm on Sony's PS-X800 turntable.

slopes downwards towards the front to leave the controls accessible. Reading from left to right, the first control is a power switch, while further over are the cue button and left and right buttons for the arm motion. In between them is another button marked *Fast* which allows the arm to be moved quickly in either direction. Next comes an illuminated panel displaying the speeds (33 1/3 or 45 rpm) together with the word *Locked* which appears when the speed is correct. The speed selector and *Repeat* button are at the end of this panel, while the *Start-Stop* switch is over on the right. This last features a built-in green indicator light, and just behind is the tracking force control which is calibrated from 0.5 to 3 grams. The black polished base is made from a special low-Q bulk-molding compound, and it stands on four large, adjustable, gel-filled feet.

#### Measurements and Use Tests

For test purposes, an Adcom XC-E moving-coil cartridge was mounted in the headshell, and the tracking force set to 1.8 grams — which I found to be op-

timum for this combination. I was curious to see what effect the electronic damping would have on the arm resonance, so this particular test was made first — after the unit was properly leveled (more about that later). After some careful measurements, the resonant frequency was found to lie between 8.5 and 9 Hz, but the rise was considerably less than 1 dB and didn't show up at all with some tests! Wow and flutter was a little better than 0.03 percent (DIN 45-507), and rumble was -65 dB using the ARRL weighting — one of the lowest figures yet measured. Tracking force calibration was very accurate — certainly within the readability tolerance. Speed was accurate too, and no drift was detected after several hours playing. Correct speed was reached in under half a revolution.

The unit was a real delight to use — a touch of the buttons would send the arm in either direction with a satisfying smoothness. Although the instruction manual shows two fingers on the controls, I found one finger could easily press two buttons at the same time for fast operation. At the end of a record,

the motor is immediately switched off and the arm returns to its *Rest* position, taking about five seconds. Because of the controlled electronic damping of the rigid arm, warped records were tracked with ease — a plus feature which is probably not as important as the absorption of the arm resonance. The unit was less susceptible to acoustic feedback than most — partly due to the damping feet and nonresonant base, although the arm design undoubtedly helps. The only criticism I have to make concerns the set-up procedure, where the user is told to check the balance by operating the cue control to see that the cartridge does not veer one way or the other. Although this seems to work satisfactorily, a small spirit level would have been more reliable for this and I would have liked to see one built in. One last thing: Those readers who are following the Great Platter Mat controversy will be interested to know that the mat on the PS-X800 is made from a heavy non-ribbed rubber and weighs about 13 ounces.

George W. Tillett

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We began with something never seen before. The microscopic vibrations of drivers in action, frozen in time. Scanned and plotted in exquisite three-dimensional detail by a laser-computer system we call ULTRA.<sup>™</sup>\*

What this revealed—in even the best conventional speakers—was distressing: Cone breakup, bell modes and other types of vibrational distortions. Undesirable—and unexpected—resonances. Driver cones and surrounds so out of phase, they all but cancel at certain frequencies. All caused, incredibly, by the design of basic elements like voice coils, dust caps, diaphragms, surrounds, crossovers and enclosures.

So we started at the beginning—with two radically different transducers. For high frequencies, a self-cooling treble unit whose precision-formed dome actually functions as the voice coil's core. Directly transforming electrical energy into perfect-piston motion, while acting as a heat sink for the voice coil. Held in place by an ultra-thin suspen-

sion, for accurate response to beyond audibility. The low-frequency driver is no less unique. A unified cone and neck, made more rigid by replacing the dust-cap with a molded center terminator. Mole-cularly bonded at its rim to a long-throw surround made of chemically related material. Resulting in a moving structure that is

essentially one piece, from center to edge, for accurate, perfect-piston response throughout the driver's range.

There is more. And it is less.

Less crossover network, because the drivers are so perfectly matched in response and efficiency. Less damping because the drivers are so accurate. And least of all, size. The SL-6 is the first compact loudspeaker of studio-monitor quality. Smaller than many "bookshelf" units, yet effortlessly handling up to 200 watts per channel. There is much more to tell. But the most eloquent way to hear it is musically, from the loudspeaker itself, at one of a select group of audiophile dealers.

But before you do, a word of caution:

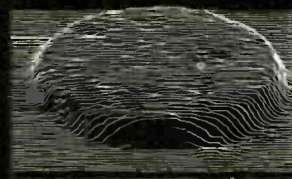
only a limited number are planned for production.

Which will limit its pleasures to a privileged few.

If the idea of being among them intrigues you, write or call for more information.

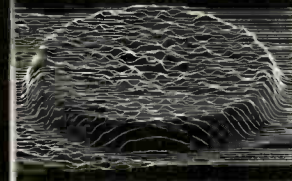
\*Ultra-accurate Laser Topographic Response Analysis.

Perfect-piston motion. The new SL-6 tweeter vibrating at 15kHz.



SL-6 drivers

Perfect-piston motion. The new SL-6 woofer operating at 100Hz.



ULTRA scan of bell mode cone behavior, long theorized but never before seen.

Conventional drivers



ULTRA scan of distortion-producing cone breakup.



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# 4

## PHASE LINEAR MODEL 1100 SERIES TWO PARAMETRIC EQ

### Manufacturer's Specifications

**Output:** 2.0 V rated, 8.0 V maximum.

**THD + N:** 0.02 percent.

**IM Distortion:** Less than 0.02 percent.

**Frequency Response:** 20 Hz to 20 kHz, +0, -1 dB.

**S/N:** 100 dB re 2.0 V.

**Amplitude Range:** ±12 dB.

**Bandwidth:** 0.18 to 1.8 octaves, continuously adjustable.

**Center Frequencies:** 63 Hz, 250 Hz, 1 kHz, 4 kHz, and 16 kHz.

**Center Frequency Adjustment**

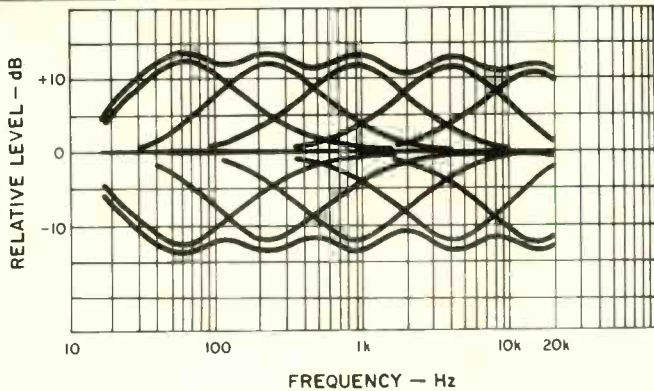
**Range:** 9 to 1, from  $\frac{1}{3} \times f_{ctr}$  to  $3 \times f_{ctr}$ .

**Dimensions:** 19 in. (483 mm) W x 5½ in. (140 mm) H x 8 in. (203 mm) D.

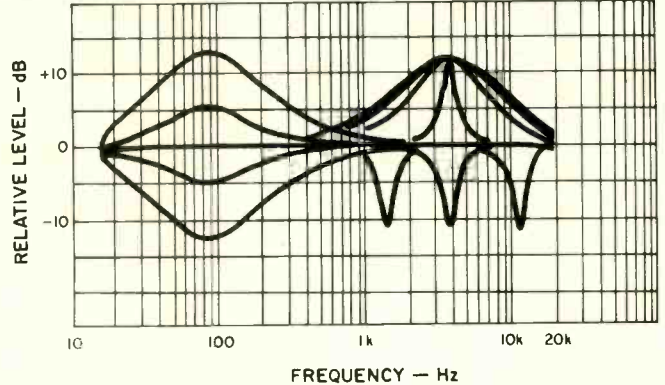
**Weight:** 9½ lbs. (4.3 kg).

**Price:** \$595.00.

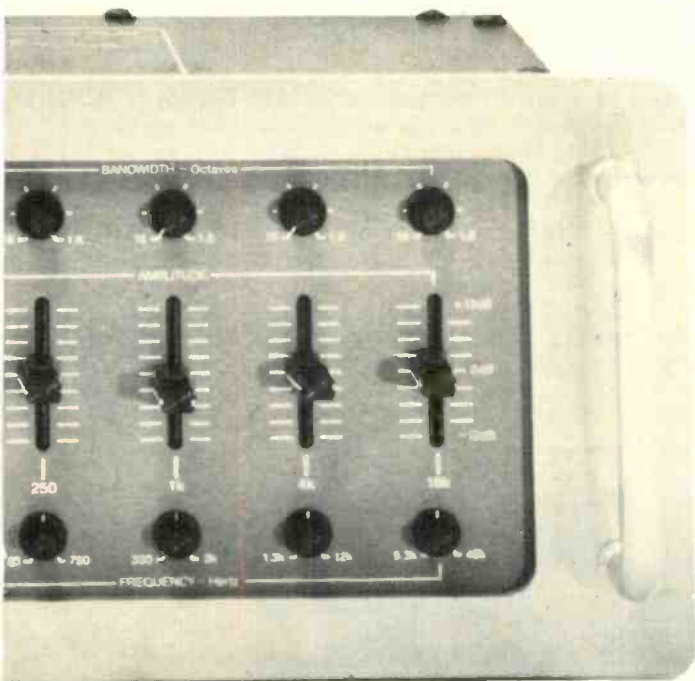




**Fig. 1** — Swept-frequency responses with and without EQ; controls flat, each at maximum boost and also cut individually; all controls at maximum boost and at maximum cut. (Bandwidths set at maximum, 1.6 octaves.)



**Fig. 2** — Response with lowest filter set to maximum bandwidth and 90 Hz, and gain control set to -12, -6, 0, +6, and +12, successively. Responses with 4-kHz filter at maximum boost with four bandwidth settings, and at maximum cut and minimum, center, and maximum frequency.

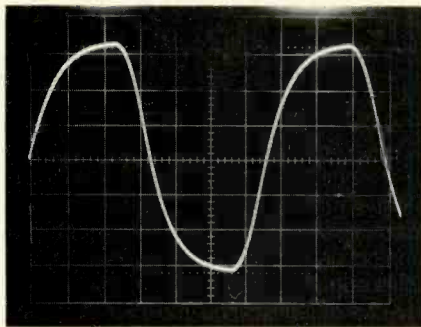


The Phase Linear Model 1100 Series Two parametric equalizer continues the attractive front-panel design of the Series Two units with the majority of the controls inset slightly against a sub-panel of darker tone. The 1100 gains immediate interest because it is a parametric equalizer, as opposed to the more common graphic EQ units with octave-spaced filters. The Phase Linear unit provides some graphic information by using 10 vertical sliders for boost/cut control, five for each channel, with a good range of  $\pm 12$  dB and a gentle, but definite, detent at 0 dB. With the frequency adjust controls in detent at the center of their rotation, the filter center frequencies are at 63 Hz, 250 Hz, 1 kHz, 4 kHz and 16 kHz, quite well chosen for covering the entire band. The frequency range of each filter from minimum to maximum is 21 to 190 Hz, 83 to 750 Hz, 330 Hz to 3 kHz, 1.3 to 12 kHz and 5.3 to 48 kHz, respectively. Thus, there is more than an octave overlap possible with adjacent filters, of definite benefit at times. Each bandwidth control has a range from 0.18 octave to 1.8 octaves, continuously adjustable. The knobs on these controls, and the frequency-adjust pots, are very small, making them hard to turn.

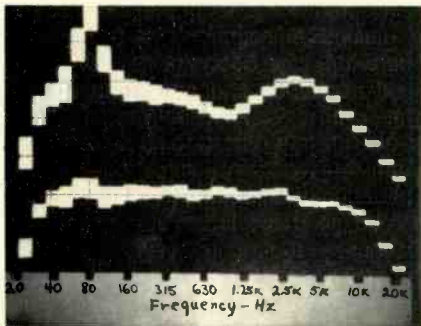
Between the two EQ-control sections are two pots to set channel EQ gain, from off to +6 dB. Overload lights are located above the pots, a desirable feature where EQ can cause very high levels. However, the 1100 lacks a scheme for matching EQ in/EQ out levels to prevent sudden jumps in system sound levels. There are push-button switches for *Bypass* (EQ out), *Monitor* (Tape Play fed to unit) and *Power*, each with a status light. A helpful signal-flow diagram is quite handily included on the top cover. The EQ in/out and tape record/play phono jacks are all on the rear panel.

Removal of the top cover revealed a full chassis-sized mother-board with a number of discrete components and 12 plug-in p.c. boards: Left and right sets of five filter channels and a level card. The EQ cards each had a color spot, coded to the matching spot next to the socket on the mother-board. The soldering was excellent, with very little flux residue. All ICs were in sockets, an aid to servicing; on the other hand, there was no parts identification.

There are several parametrics with three EQ sections, but the 1100 has five — a definite plus for this unit.



**Fig. 3 — Output at maximum gain with 1.5-V 30-kHz square-wave input. (Scales: Vertical, 1V/div.; horizontal, 5  $\mu$ S/div.)**



**Fig. 4 — Top, response of "speaker" before EQ; bottom, response after EQ. (Scale: Vertical, 5 dB/div.)**

### Measurements

The first checks of the 1100 EQ characteristics were made with all of the frequency-adjust controls in detent. A series of swept-frequency responses were taken as shown in Fig. 1. The response with EQ but with all sliders in detent was within a small fraction of a dB from 20 Hz to 20 kHz. The 3-dB down points were at 9 Hz and at 46.9 kHz; without EQ (in Bypass), they were at 8 Hz and 89.3 kHz. Plots were also made of each of the filter sections at maximum boost and cut while set to maximum bandwidth. Finally, responses were run with all filters at maximum boost, and then at maximum cut. It can be seen that filter shapes are very much the same, and that all of the boost and cut maxima are very close to 12 dB from zero. The combining of the outputs is fairly good, with 2 to 3 dB ripple.

Additional tests were conducted to illustrate the versatility of the 1100 parametric EQ. The first plots made in Fig. 2 show the results of adjusting the amplitude parameter with the lowest

filter, set at 90 Hz. Sweeps were made for settings from -12 to +12 dB. Next, the 4-kHz filter was set to maximum boost, and four sweeps were made with different settings of the bandwidth parameter. Finally, the 4-kHz filter was set for maximum cut and minimum bandwidth, and the frequency control parameter was varied from nominal, to minimum, and to maximum for successive sweeps. There are many other possibilities, of course, but Fig. 2 emphasizes the three basic parameters that can be varied. The reader should understand that all combinations can be used, such as moving a filter up in frequency at the same time that the response is boosted and the bandwidth made more narrow. Equalizers without facilities for adjusting these three parameters are not classified as true parametric.

With the frequency adjust pots in detent, the frequency of peak responses were generally within 3 percent of spec, very good. The 1-kHz filter peak was almost 10 percent low, but such a discrepancy is definitely *not* a problem, especially with a parametric equalizer. The frequency range was as specified, from 1.3 to 12 kHz for the 4-kHz filter, for example. The bandwidth at maximum boost agreed with the spec, but the change from 0.18 octave to 1.8 octaves occurred in less than half the rotation of the pot. A spreading out of the effective changes and a calibrated scale appeared to be in order.

The input impedance was 44 kilohms over most of the band, falling slowly at the high end to 23 kilohms at 20 kHz, plenty high enough in any normal circumstances. The output impedance was less than 8 ohms, which is very low and most unlikely to be affected by any loads that are connected. The maximum voltage, just below clipping, was 7.8 V over most of the band, falling slightly to 7.5 V at 20 kHz. The overload indicator turned on at about 0.4 V lower (7.4 V) for most of the band, but required a higher voltage (8.4 V) at 20 kHz. The input overload level was close to 30 V. The output polarity was the same as the input, with and without EQ.

The harmonic distortion with 1-V in and 2-V out was 0.0026 percent at 20 Hz, 0.0020 percent at 1 kHz, and 0.016 percent at 20 kHz — all excellent figures. The SMPTE IM distortion was about 0.005 percent up to 2-V output, rising to 0.01 percent at 3.5-V output. With all controls at +12 dB and the gain adjusted for 2.0-V output, THD plus noise was 0.002 percent, with  $HDL_2 = 0.0012$  percent and  $HDL_3 = 0.0015$  percent. These are certainly most excellent figures, achieved even with the maximum boost. With 1-V in and controls set flat, the distortion was just 0.12 percent at 100 kHz. Figure 3 shows the output of the





Other plus characteristics include very low distortion and noise, and excellent ranges of adjustment for handling audiophile EQ tasks.

1100 with a 2.0-V, 30-kHz square wave in. The rounding of the waveform shows the result of the small-signal high-frequency roll-off which actually prevents the unit from reaching a slew limit. The tests indicated that the slew factor is somewhat greater than 5, the specified figure. The signal-to-noise ratio was greater than 100 dBA, referred to 1 V with 1-kilohm input terminations. The noise was less than 10  $\mu$ V, A-weighted, and that was the lower limit of the test equipment.

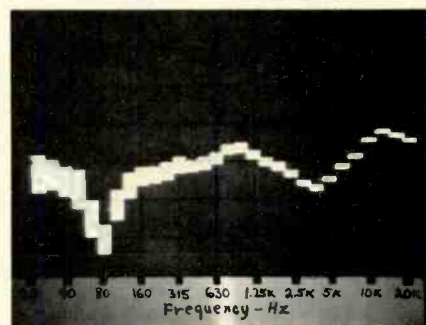
#### In-Use Tests

The illustrations in the 28-page owner's manual are generally very good and include filter-response curves, a schematic, and a "house curve" with a recommended high-frequency roll-off. The text discusses EQ by ear, by hand with a record and an SLM, and by eye — with particular reference to the Model 1200 Series Two RTA. There are some oddities in the text that could be confusing to the neophyte. For example, in referring to a 6-dB boost at 60 Hz, this statement is made: "The frequencies around 60 Hz are made twice as large as those around 1 kHz."

To show the versatility of the Model 1100, a speaker output was simulated using pink noise and a  $\frac{1}{3}$ -octave equalizer. The top display in Fig. 4 shows the "speaker" response with a 10-dB peak around 80 Hz, falling response around 1 kHz at the crossover, a broad peak around 3.15 kHz, and a falling response above 5 kHz. What is simulated is pretty bad, and audiophile speakers should be much better than this. But what is possible with EQ? The bottom display in Fig. 4 is the result after a few minutes of adjusting the 1100. The roll-off from 1 to 10 kHz is purposeful, and the response was allowed to drop rapidly above that point. Note that variations over the rest of the band are simply gone.

The response of the 1100 with the EQ used is shown in Fig. 5. Note the narrow-bandwidth cut used to remove the 80-Hz peak, with other shaping of a rather broad nature. The actual settings used were: -11 dB at 80 Hz with narrow BW, -1.5 dB at 200 Hz with narrow BW, +3 dB at 1 kHz with medium BW, -4 dB at 4 kHz with medium BW, and +3.5 dB at about 14 kHz with medium BW. The procedure was a simple matter of adjusting all parameters necessary while watching the  $\frac{1}{3}$ -octave display. Repeating the process with an octave-band RTA (Phase

Fig. 5 — Response of EQ used to smooth "speaker" of Fig. 4. (Scale: Vertical, 5 dB/div.)

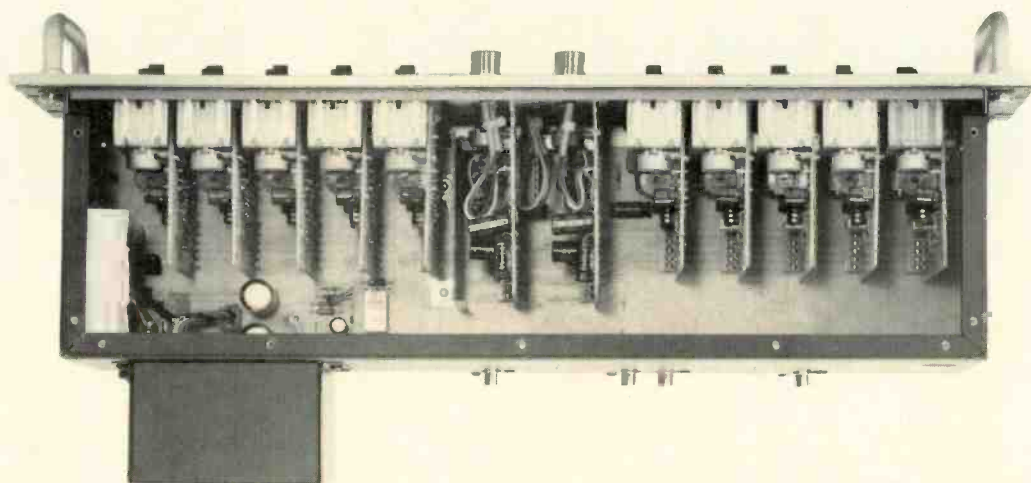


Linear Model 1200) gained almost exactly the same results in the final "speaker" response. The advantage gained with the parametric EQ over the octave-band type in such cases is that a fairly accurate inverse response curve can be made with the parametric, matching a peak with a notch, setting bandwidth to match shape, and sliding frequency for exact alignment. The disadvantage of any parametric equalizer is that it can generate unusual and unmusical responses, and for the best results, careful listening and good metering (such as an RTA) are required.

There are quite a few parametrics with three EQ sections per channel, but the 1100 has five filters, all of which aided in the smoothing discussed above. This is a definite plus for this unit, in comparison to other EQs with fewer sections. Larger knobs would be of aid in making frequency and bandwidth adjustments, and spreading bandwidth changes over the entire pot rotation would facilitate making adjustments. A gain-match scheme for EQ/bypass switching would reduce level jumping. At the least, there should be 0-dB gain index marks for the channel level pots. Other characteristics on the plus side are very low distortion and noise and excellent ranges of adjustment for handling most any audiophile EQ tasks. The Phase Linear Model 1100 parametric equalizer has a higher price than the great majority of octave-band EQs, but it can do many things none of them can.

Howard A. Roberson

Enter No. 93 on Reader Service Card



## 5

## PHASE LINEAR MODEL 1200 SERIES TWO RTA

### Manufacturer's Specifications

**Bands:** Twelve, from 16 Hz to 31.5 kHz.

**Range:** 20 dB with 1-dB steps, 40 dB with 2-dB steps.

**Display Mode:** Dot (single LED) or bar (LED column).

**Rate:** Instantaneous peak attack with decays of 20 dB/S (Fast) or 2 dB/S (Slow).

**Filters:** Two-pole pair to Class I requirements of ANSI Standard S1.11-1966 (R1975).

**Line Input Sensitivity:** 7 mV for 0-dB indication.

**Sound Level Range:** 52 to 100 dB SPL.

**Microphone Response:** 20 Hz to 20 kHz  $\pm 2$  dB, random incidence.

**Pink Noise Output:** 300 mV rms, 16 Hz to 20 kHz  $\pm 1$  dB.

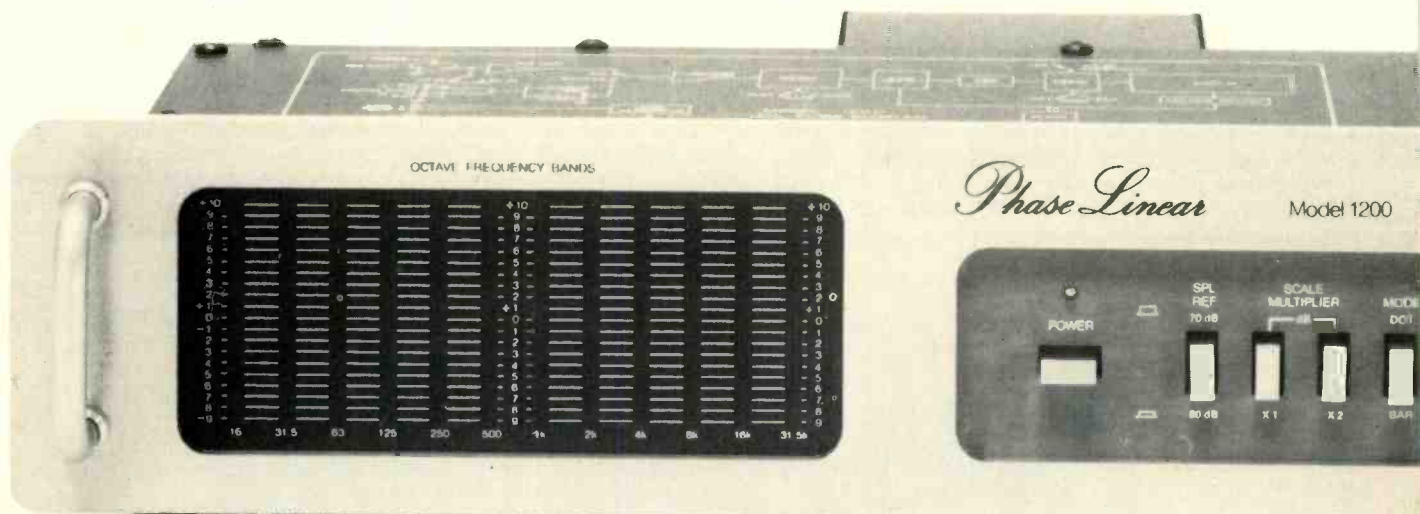
**Dimensions:** 19 in. (483 mm) W x 3 1/2 in. (90 mm) H x 8 in. (203 mm).

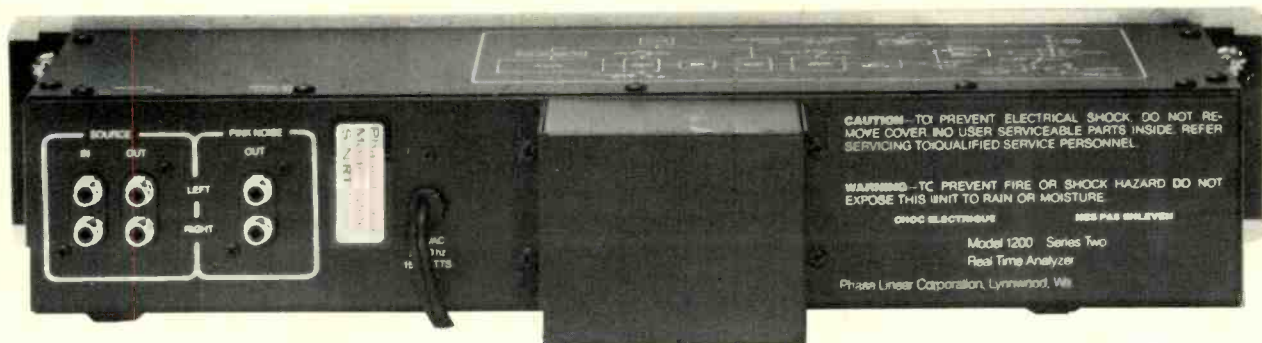
**Weight:** 10 lbs. (4.5 Skg).

**Price:** \$675.00.

Phase Linear Model 1200 Series Two real time analyzer adds up to quite a mouthful, so we'll shorten its title to the "1200 RTA." This unit's attractive front panel gives a definite impression of quality. There is low contrast between the function labels and the panel background, which may present a legibility problem in low-level light situations. A row of push-button switches provide selection of *Power* (on/off), *SPL REF* (70/80 dB), *Scale Multiplier* (X1/X2), *Mode* (dot/bar), *Rate* (fast/slow), *Pink Noise*

(on/off), and *Input* (mike/source). The SPL-reference selector effects a change in the mike amp gain, and the choice of 70 or 80 dB SPL is a good one for most audiophile usage. The display scale from "-9" to "+10" gives a nominal 20-dB range with X1 and a 40-dB range with X2. The *Dot* display mode has just the level-indicating LED illuminated in each channel. In *Bar*, however, all other LEDs below these will also be on, making a bargraph type of display. *Rate* sets the decay rate of the display in





each of the bands. Possible combinations would be *X1, Dot* and *Slow* for equalizing with pink noise, and *X2, Bar* and *Fast* for monitoring music, a useful collection of choices.

*Source* is what others might call *Line* or *AUX*, and there is the essential level control for matching the input voltage to the display sensitivity. The LED matrix is 20 (level) by 12 (frequency band). Most RTAs in this general class have 10 bands, and the 1200 is unique as it includes 16-Hz and 31.5-kHz bands, which

can aid in checking end-of-band performance. Horizontal lines are imprinted on the face, joining each column, to ensure reading the levels correctly. The LEDs are just medium bright, but the panel has low reflectance, so reading a display in normal room lighting is fairly easy. The microphone input jack accepts the supplied electret mike, which comes complete with 20 feet of cable, a table stand, and a tie-clip type holder. One pin of the jack/cable supplies +4 V to the built-in mike preamp.

On the top cover of the 1200 is a signal-flow diagram for handy reference, while on the back panel are the pink-noise output jacks and dual sets of *Source* input jacks to facilitate any paralleling desired. With the removal of the top cover, the full chassis-size mother-board could be seen, supporting boards for three filter channels, the pink noise, the sequencer, and the display plug-in. There were also discretes and ICs on the mother-board, with all ICs in sockets. There was a little interference between components on the pink-noise card and the plug from the power transformer, mounted on the back panel outside of the main chassis — a possible aid in eliminating hum pickup. The soldering on the p.c. boards was excellent, perhaps the best I've ever seen.

### Circuit Description

Figure 1 is the signal-flow diagram of the 1200 RTA, and in this form the circuitry is quite easy to understand. As mentioned earlier, the +4 V mike power is fed out via one of the pins of the input connector. The 70- or 80-dB SPL reference is selected at the input of the mike amp. The left and right inputs at *Source* are summed and amplified, and the *Source Level* pot controls the output to the mike/source switch. The following buffer amp feeds the bank of 12 filters, which have selection of *Fast* or *Slow* decay. "Row Select" scans the outputs of the filter bank under the control of the clock. Each filter output, when selected, is amplified by the log amp and fed to the level logic. This section includes control for 1- or 2-dB per step sensitivity and for dot or bar display mode. The clock also drives the column select circuit, in synchronization with filter-band selection. The display, therefore, receives level information which is correctly guided to the correct display column sequentially, filter bank by filter bank. The combination of scanning rate and persistence of illumination



The peak responses of all RTA filters with a continuous test tone were within  $\pm 0.5$  dB, excellent performance.

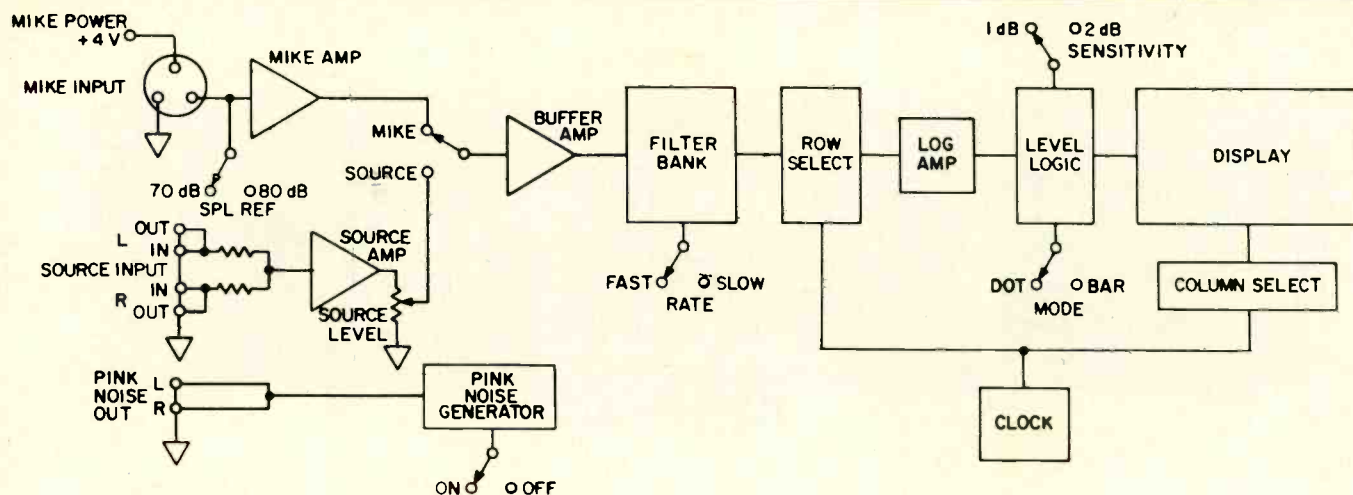


Fig. 1 — Signal-flow diagram, Phase Linear 1200 RTA.

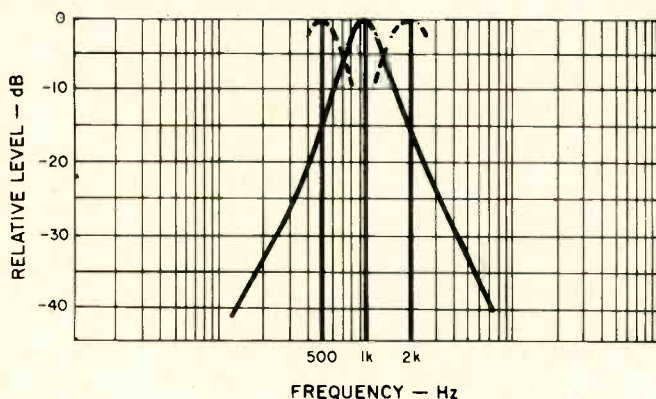


Fig. 2 — Frequency response of 1-kHz filter, typical response of 1200 RTA.

and vision results in a display appearing to be continuous and flicker-free. The pink-noise generator has simple on/off control with the output connected to paralleled left and right jacks.

#### Measurements

The peak responses of all of the RTA filters with a continuous test tone were within  $\pm 0.5$  dB, with the exception that the 63-Hz filter was slightly more sensitive and the 31.5-kHz channel was a shade less sensitive, excellent performance. The center frequencies of the 12 filters were all within 1 percent of those specified by ISO, superior to the majority of RTAs. Figure 2 shows the response of the 1-kHz filter, which appeared to be typical; note the crossovers to adjacent channels at -6 dB and that the response was 15 dB down at the center of the adjacent filters. This filter shape provides good rejection of out-of-band energy, but there will be a drop in indicated level with discrete tones shifted away from the center frequencies. In general, this

is not a problem when using the unit with pink noise or when monitoring music.

The 1200 RTA's response, using an Ivie IE-20A pink-noise source, was within 0.5 dB at most points, although there was a sag at the two lowest and highest frequencies of about a dB. With the built-in generator as the source, there was some low-end droop, but the high end was up about a dB. As a further check, the 1200 RTA generator was fed to an Ivie IE-30A  $\frac{1}{3}$ -octave RTA. It can be seen (Fig. 3) that there is some low-frequency droop and some rise at the highest frequencies. The deviations were less, however, as displayed on the Phase Linear unit, and that's of more importance in the practical use of the 1200. The generator output level was 350 mV rms, and 290 mV rms with the measuring bandwidth restricted to 20 Hz to 20 kHz. The output impedance was quite low, with very little drop in level with a change in load from 50 to 10 kilohms.

The charge times, from "-9" to "+10" as shown on the display, were about 15 mS in Fast and 150 mS in Slow, at variance with the specified "instantaneous peak attack," but fast enough, however. The decay times from "+10" to "-9" were 400 mS for Fast and 4 S for Slow, and the decay rate was fastest at the start. Each of the steps in the display was consistent with increasing level, very close to 0.9 dB for X1 with "+10" at +8.8 dB actual and very close to 1.8 dB for X2 with "+10" at +17.8 dB actual. These are actually very good figures, and plenty close enough for any RTA usage.

The Source input sensitivity was 6.7 mV for a discrete tone and about 20 mV with pink noise, much lower figures than with most units. The input overload, as shown on the display, was at approximately 0.7 V, which is somewhat on the low side and a possible source of problems. A figure of 2 V or more would be desirable. Perhaps some input sensitivity could be "traded" for a higher overload point. I noted that with pink noise fed in directly, the maximum indications with X2 were at "+5" (+10 dB actual), regardless of input level, restricting the total range to 30 dB. With music inputs and different levels from band to band, there was relatively little compression at any point. A number of

The 1200 RTA delivers flat responses, accurate filtering and SPL calibration, and very good display characteristics.

tests indicated that the microphone sensitivity matched the display reference within a dB or so. Although Phase Linear states that the microphone should be pointed directly at the speakers, I got better results (closer to an Ivie IE-30A) with the microphone turned away almost 90 degrees, close to grazing incidence for the direct energy. The manufacturer states that the microphone is flat ( $\pm 2$  dB) with random incidence, which seems contradictory to the instruction of aiming the mike at the direct field. In any event, the microphone is capable of very good response, but it does vary with changes in orientation and the acoustic field conditions. Any user should experiment to see which orientation provides the best guidelines in his listening room.

#### In-Use Tests

The 28-page owner's manual has a nice open format with very good text and illustrations, including schematic diagrams. There are a few oddities, however, and the definitions of white and pink noise are incomplete. There is also a system troubleshooting chart, which may be a little complicated for some but is really quite good. The general operation of the 1200 RTA was simple and direct, although there was a little confusion at times on the position of a push-button switch because of the small difference between the in and out positions. All switches and functions were completely reliable throughout the testing period.

Earlier comment was made on the medium-bright display, which turned out to be quite readable with medium-high light levels. I definitely preferred the bar mode, with *Fast* and *X2*, for monitoring music. With fairly dim lighting, the 1200 showed one of the best music-monitor displays observed to date. EQ tasks were best in *Slow* with *X2* at the start, switching to *X1* for final smoothing. The 70-dB range was a good match for low-level

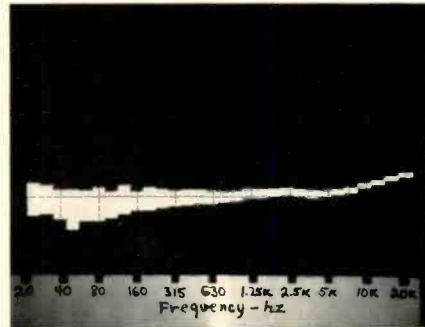
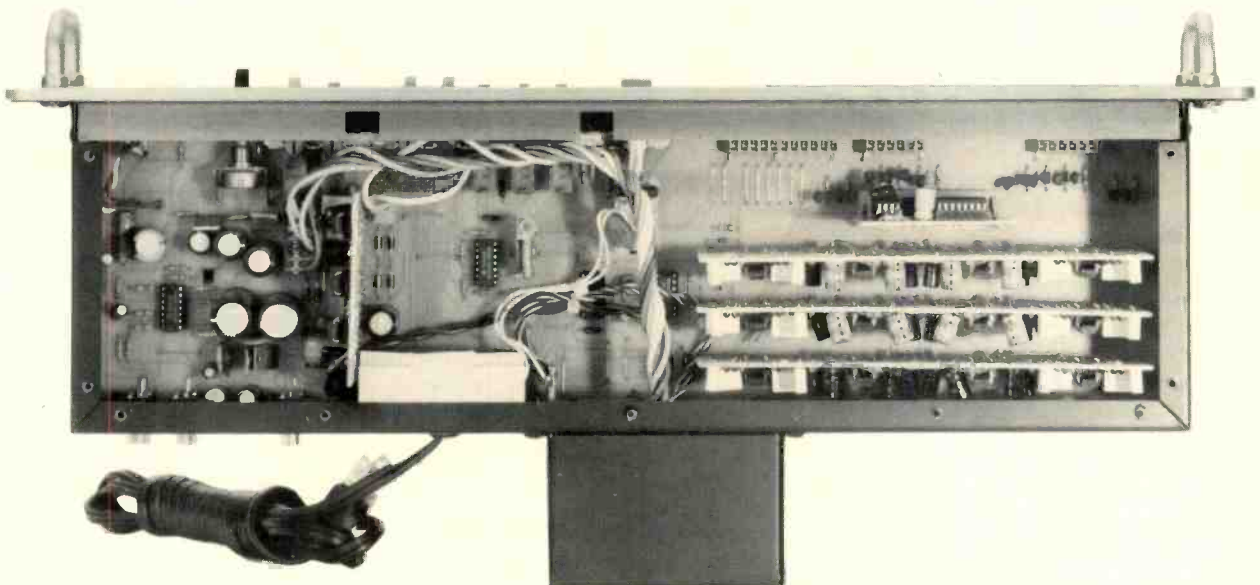


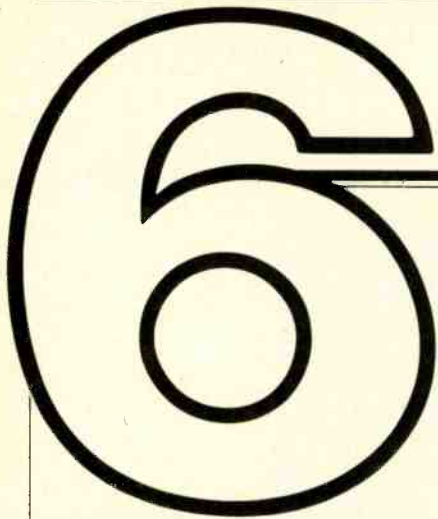
Fig. 3 — Spectral output from pink-noise generator. Vertical scale: 5 dB per division.

operation, but other in-building activities that generated unwanted noise required the use of the 80-dB range. A 90-dB range would have been helpful in one instance, but this level is tough to take for long if running pink-noise tests. On several occasions, the 16-Hz and 31.5-kHz bands provided additional insight on the total spectrum. The rather low input-voltage limit discussed earlier could be a problem under some circumstances, but no limitations actually appeared during the in-use tests. The Phase Linear Model 1200 RTA has a higher than average price, for which it delivers flat responses, accurate filtering, accurate SPL calibration, an additional channel at each end of the band, and very good display characteristics.

Howard A. Roberson

Enter No. 94 on Reader Service Card





## KOSS K/4DS DIGITAL DELAY SYSTEM

### Manufacturer's Specifications Digital Delay Unit

**Outputs:** 20 watts/channel at 4 ohms, 15 watts/channel at 8 ohms.

**Delays:** *Auditorium*, 43.8 to 70.1 mS; *Concert Hall*, 35.0 to 56.9 mS; *Theater*, 21.9 to 35.0 mS, and *Club*, 13.1 to 21.9 mS. Signal continues to be re-generated at a decaying rate.

**Dimensions:** 16½ in. (41.9 cm) W x 9 in. (22.86 cm) D x 4 in. (10.16 cm) H.

**Weight:** 12½ lbs. (5.62 kg).

### K-2S Speakers

**System Type:** Two-way.

**Drivers:** 3½ in. woofer and 2¼ in. cone tweeter.

**Weight:** 6¼ lbs. (2.81 kg).

**Total System Price:** \$459.00.



One of the reasons why even the very best stereo component system cannot totally recreate the experience of attending a live concert has to do with the listening "space" itself. In a large concert hall, you first hear sounds of the orchestra coming directly at you, followed some time later by a complex series of sound reflections coming from the walls, ceiling and other surfaces in and about the auditorium. The sum of all these reflections, and the way in which they reach your ears, has been called the reverberant sound field or the "acoustics of the hall." No matter what you call it, a smaller listening environment cannot duplicate the sound naturally. Even if your program source contains a certain amount of reverberant sound (mixed into the stereo program during the recording studio mix-down), that reverberant sound, along with the "direct" sound, comes at you

only from your two front-positioned loudspeakers instead of from everywhere about the listening room.

In recent years, many manufacturers have come up with electronic circuits which attempt to simulate the reverberant sound field of larger listening spaces by supplying time-delayed signals to a pair or rear-positioned loudspeakers. Various techniques of cross-mixing of signals, recirculation of delayed signals to simulate decaying reverberant sound, and the like have been used to try to create the sonic illusion of a listening space that seems larger than it really is.

In the case of the K/4DS system, Koss engineers have developed a miniature 16,384-bit "computer" that has been programmed to permanently store four degrees of "ambience" in digital format: A night club, a theater, a large concert hall, and a

**1939...FIRST DIRECT-DRIVE TURNTABLE SYSTEM.  
1951...FIRST MOVING-COIL CARTRIDGE.  
1972...FIRST DIGITAL (PCM) RECORDING.**



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large auditorium. The electronic section of the K/4DS converts part of the program material into a digital code, delays it by storing it in a RAM (Random Access Memory) for a selected amount of time delay, reconverts it to an audio signal in a digital-to-analog converter, and finally plays it through a pair of Model K/2S ambience speakers (which are included with the K/4DS) located at the sides of the listening room.

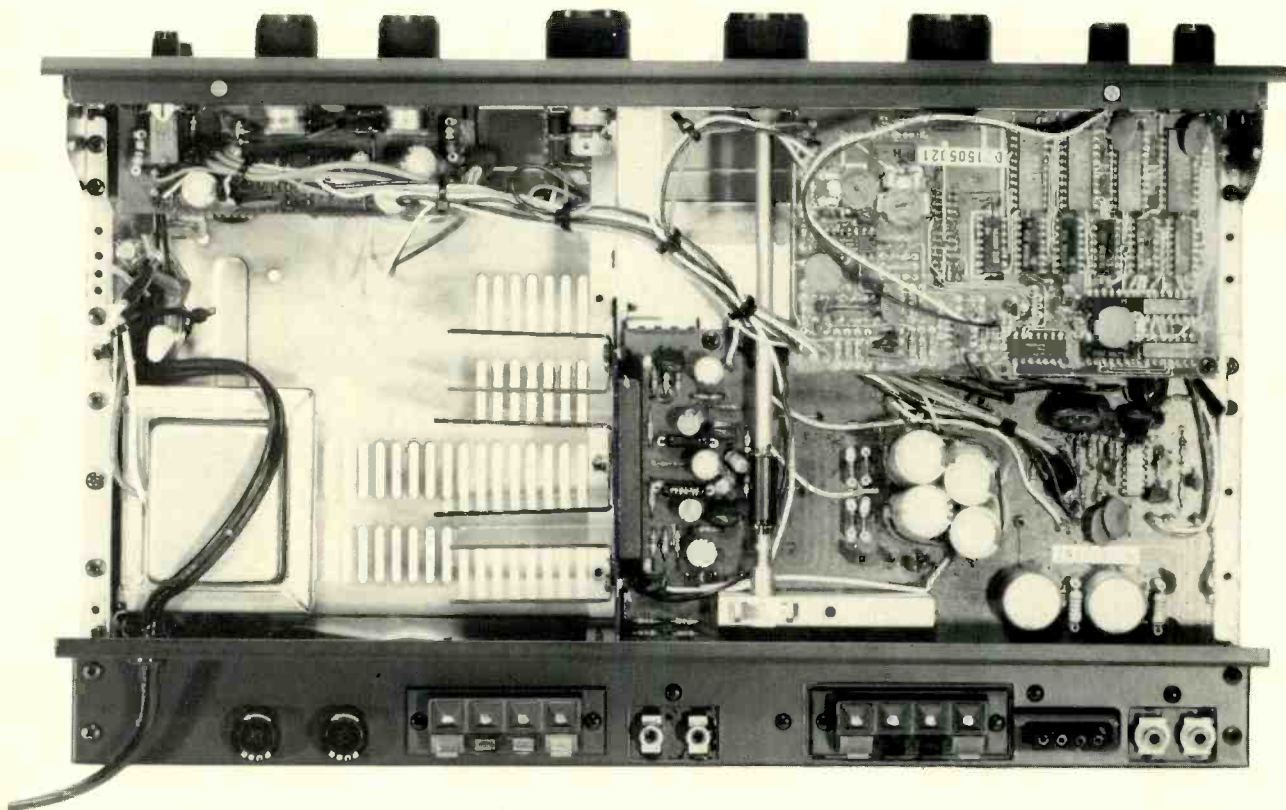
#### Control Layout

The K/4DS digital delay system consists of the electronics just described plus a built-in stereo amplifier with a power output capability of approximately 20 watts per channel and a variety of controls which allow you to achieve various room expansion effects. Included, too, are separate stereo stereophone amplifiers which allow the listener to create ambience or hall effects even when listening to music via phones. Recently, Koss has also added the two small speaker systems to the package without increasing its price.

Controls associated with speaker reproduction of music include an environment selector with switch positions labelled *Club*, *Theater*, *Concert Hall*, and *Auditorium*. These designations are another way of specifying short, medium, long, and very long initial time delays. A mode selector permits you to choose phones-only, stereo, or *4th Dimension* listening, while a *Dimension* control nearby determines the level of sound that will be heard from the rear-positioned K/2S speakers. Two smaller

knobs at the left end of the panel are used to set gain and equalization. The gain control is used to set up the equipment during initial installation so that levels of your associated stereo system are properly matched to those of the K/4DS. The equalization control, when set to the "on" position, adds some bass boost to the rear-channel outputs and rolls off response below 50 Hz, the presumption being that the small K/2S speakers (or any other second set of speakers you might have) are not likely to be able to handle lower frequencies at high power levels as well as the front or main pair of speakers in your system.

The rear panel illustrates just how versatile Koss has made this unit. Since it might end up being used with a receiver, with separate components or with an integrated amplifier, all contingencies were taken into account at the design stage. At the left of the rear panel are a pair of rear speaker fuse-holders, and to their right are spring-loaded rear speaker connection terminals. Two phono jacks come next, intended for connection to a separate power amplifier in case you feel that the self-contained amp is inadequate. The banks of speaker terminals which follow can be used for input of stereo signals directly from your existing speaker terminals if you have no access to the primary stereo signals from any other source on your present components. There is also a special 4-pin connector which, with the aid of a mating 4-wire cable supplied, enables you to hook into an existing stereo system at the receiver's or amplifier's speaker output terminals if this turns out to be more convenient. Finally, at the







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So the point is simple. If you want to play records upside down, there are several turntables to choose from. But if you do your record playing right side up, there's really only one name to choose. It's Sony.

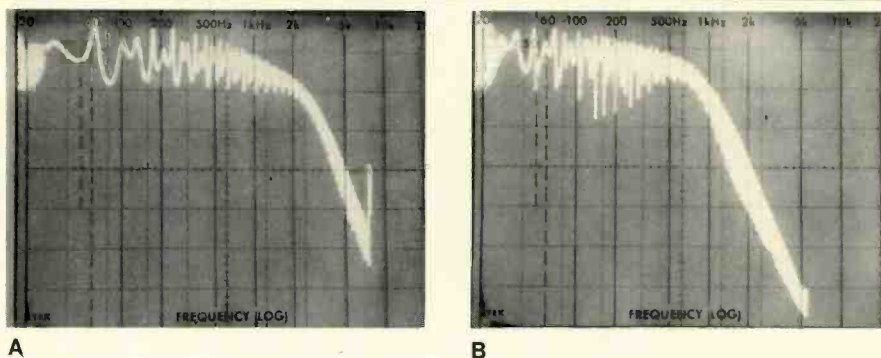
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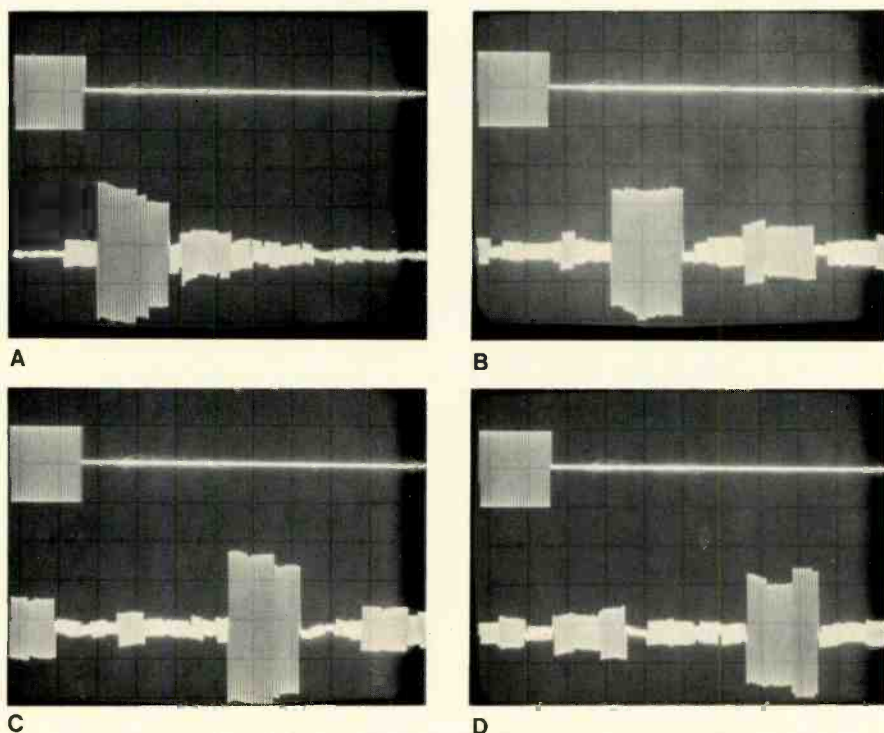
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The unit is relatively unsophisticated as such devices go, yet it is quite effective when properly adjusted.

**Fig. 1**—Response of any ambience time-delay system rolls off at high frequencies, the cutoff point being determined by the amount of digital delay employed. In A, the minimum *Club* setting was used, while in B the maximum *Auditorium* setting was employed.



**Fig. 2**—In all of these scope photos, upper trace represents the input tone-burst signal, while lower traces show progressively longer initial time delays in the *Club*, A; *Theater*, B; *Concert Hall*, C, and *Auditorium*, D settings of the unit's *Environment* control. Also visible are lower-amplitude recycled reverberant signals and crossed signals which combine to simulate a total reverberant field.



extreme right of the rear panel are a pair of phono-tip jacks intended for connection to a preamplifier's output, if the associated system employs such a separate component.

#### Measurements

It is virtually impossible to measure the performance of a unit such as this using steady-state test signals. It is even difficult to measure the amplifier portion characteristics alone, since signals applied to it are subjected to processing by the digital circuitry which results in the audio time delays, cross-mixing, and blending described earlier. All of this, of course, is as it should be, but it makes the usual sorts of measurements of frequency response, distortion, etc. very difficult to perform. Consider, for example, the spectrum analyzer plots shown in Figs. 1A and 1B. One sees a sort of "comb filter" effect which arises because of alternate cancellation and reinforcement of discrete frequencies as they are "swept" through the system, undergo-

ing time delays that cause in-and-out-of-phase conditions with changing frequencies. Nonetheless, considered as an "envelope" of response, one can see that with shorter time delays (the *Club* setting was used to plot the display in Fig. 1A), response of the digitally delayed signal extends outward to a higher frequency than when the longer, *Auditorium* setting was selected for the display shown in Fig. 1B.

In Figs. 2A, 2B, 2C, and 2D I have attempted to show how the initial time delay varies with the different environment settings on the front panel control. The upper trace is, in all cases, the input tone burst signal; sweep rate is 10 milliseconds per horizontal division on the oscilloscope display. Figure 2A, *Club*, shows an initial delay of a relatively short 20 mS. In the next position (Fig. 2B), *Theater*, the initial delay has increased to about 38 mS; in Fig. 2C, *Concert Hall*, it is up to around 55 mS, while finally, in Fig. 2D, *Auditorium*, the initial time delay has increased to more than 70 mS. Other secondary recirculatory

The Koss K/4DS time-delay unit is the only one which offers headphone facilities.

signal effects are also in evidence in each of these displays, including Koss' unique cross-channel circuitry that delays and channels portions of one channel signal to the opposite ambience speaker and vice versa.

I was able to measure approximate amplifier output, which turned out to be 18 watts per channel into 8-ohm loads before observable clipping occurred, and 22.1 watts per channel using 4-ohm loads. As mentioned earlier, frequency response rolls off fairly rapidly above around 4 to 5 kHz, depending upon the setting of the environment control, but this is as it should be since reflected sounds (those very sounds which the system is trying to recreate electronically) do not have the wide frequency response of directly perceived sounds in a real concert hall situation. This occurs because high frequencies are more easily absorbed by the surfaces against which they bounce. If the rear ambience speakers were to reproduce all frequencies of the program material, even if appropriately time-delayed, the effect would be most unnatural.

#### Use and Listening Tests

The Koss K/4DS is about as simple a unit to use as any of its type I have worked with over the past two years. That's another way of saying, I suppose, that it is also a relatively unsophisticated device as these devices go. Still, it is quite effective when properly adjusted and does a reasonably good job of simulating the larger listening spaces in which live performances normally

take place. By "keeping it simple" Koss was able to provide everything you need for ambience restoration at a price that is lower than some manufacturers charge for just the time delay unit alone (minus the needed pair of amplification channels, the extra pair of speakers, etc.).

Some of the more complex (and more expensive) time-delay units available do provide more control flexibility and time-delay settings, but on the other hand, none of those units offer headphone facilities, as does the Koss K/4DS. In using this or any other time-delay system, I find that too much of a good thing is generally bad. Add in too much delayed sound, and the music becomes blurred and begins to sound as if the whole system is going to "take off" in a continuous echo effect. If you are conscious of or can hear the rear speakers as discrete sources of sound, you probably have the volume up too high to these speakers. If all you sense is an apparent increase in listening room dimensions, you are probably operating the device at optimum settings of its controls.

If money is no object, there are certainly more expensive time-delay units available that may give you a degree of control not provided by the Koss K/4DS system. But if you crave a "larger" listening room and want to spend as little as possible to achieve it, at least electronically, then the Koss K/4DS is a good add-on system extremely well priced for what it accomplishes.

Leonard Feldman

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## Dbx-Encoded Discs

For over two years, dbx has been actively engaged in producing low-priced dbx disc decoders and they have also released a wide variety of program material from a number of record companies. The man behind this thrust is Jerome Ruzicka, the marketing head of dbx, who feels that the dbx-encoded disc might become, for the audiophile, an interim step on the uncertain path to a digital home music medium.

I first heard dbx-encoded discs about eight or ten years ago. I was not impressed; there seemed to be problems of overmodulation at high frequencies. The recent standard, dbx II, which has been developed specifically for discs, has overcome most of these earlier problems. The program is equalized to give it a high-frequency rise, and it is then fed to a 2-to-1 compressor. This element in the chain compresses the signal so that, say, a 50-dB range is reduced to 25 dB. On playback, a 1-to-2 expander restores the dynamic range, and the 25-dB signal is doubled to its original 50 dB. A complementary equalizer rolls off the boosted signal, and the original program is restored.

When examining a dbx-encoded disc, you notice some significant differences from standard audiophile discs. We are all used to seeing the generous spacing between grooves on many standard discs (the cannon shots on Telarc's *1812 Overture* are a good example), but you won't find such spacing in dbx discs because the low-frequency information has been reduced during the encoding process. As you reflect a strong light off the disc, you will be aware of the density of the signal on the disc, due both to the high-frequency boost as well as the signal compression.

While we are all used to encode/decode noise-reduction systems applied to tape recording, the application to disc is relatively recent. In tape systems, we are dealing with a predictable and constant noise level, which can be disguised relatively easily. With the disc medium, we encounter a widely unpredictable noise level — and one that is plagued with loud ticks and pops from time to time. The dbx process is no cure-all for the usual ills of domestic pressing; a noisy dbx pressing might be okay when the music is soft (and the noise-making func-

tion at a maximum), but when the music gets loud, the ticks and pops may not be so well disguised.

You must also watch the playback level of dbx discs carefully. Because of the wide range of noise reduction, it may not be apparent just how loud things are really going to get! If you set playback level during softer passages, then overload and acoustical feedback may result when the loud passages occur. Better it is to set playback levels during the loudest passages so that your system's capabilities will not be strained. Most of the discs I have had the pleasure to preview have been excellent from the processing point of view, and it is now appropriate to look at a few of them and compare them with their standard original versions.

Early in the dbx program, Ruzicka identified a pair of discs which had become underground audiophile favorites, the Turnabout recordings of the Dallas Symphony Orchestra under the direction of Donald Johanos of music of Rachmaninoff and Copland. The original recording and disc mastering were done by David Hancock, the remarkable engineer-pianist. What had set these records apart was the integrity of a simple, two-microphone pickup with absolutely no manipulation of dynamics. Hancock recorded the works on a modified Ampex 350 at 30 ips and made the disc transfers with Ortofon cutting equipment. While the Turnabout pressings were pretty noisy, the quality of Hancock's work was readily apparent.

**Copland:** "Billy the Kid," "Rodeo," "Fanfare for the Common Man." Dallas Symphony Orchestra; Donald Johanos, conductor. Turnabout TV 34169, dbx SS-3007.

Playing the dbx version, one is immediately aware that pressing noises are totally unobtrusive; only the slight hiss level of the source tape is apparent behind the program. Curiously, the original 1967 pressing, marred as it is by conventional pressing noises, exhibits less tape hiss. I suspect that somewhere during the last fourteen years the original Hancock 30-ips master was transferred to 15 ips, and it is that generation of tape hiss that we are hearing. In any event, the absence of pressing noise in the dbx version makes it the clear winner. (Even a bit of print-through from the 30-ips original is evident at times.)

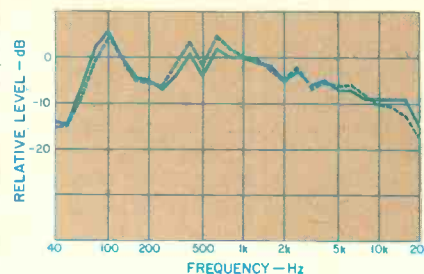


Fig. 1—Spectra for first 3:10 of "Billy the Kid." Solid line is original 1967 pressing; dashed line is for dbx version.

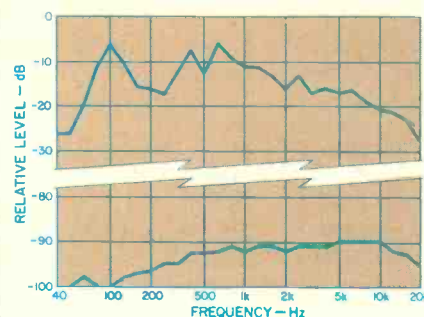


Fig. 2—Maximum dynamic range of the dbx disc. Upper curve is the peak-hold third-octave for first 3:10 of "Billy the Kid," dbx disc. Lower curve is A-weighted spectra of lead-in groove, dbx disc.

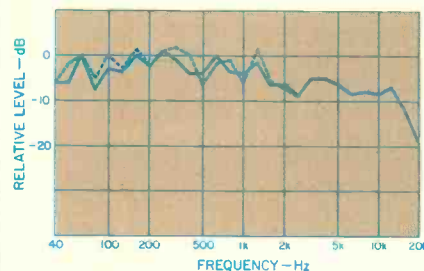


Fig. 3—Spectra of Crystal Clear organ recordings, see text. Solid line is direct-to-disc original; dashed line is dbx version.

The overall tracking of the encode/decode dbx function is shown in Fig. 1. Here, the solid lines indicate the peak-hold one-third octave spectrum of the original 1967 disc for the first 3:10 minutes of "Billy the Kid." The dotted lines indicate the spectrum for the dbx version. The broad departures in the 315 to 800 Hz range and above 10 kHz may easily be the result of subsequent equal-

ization of the original program. All things considered, these deviations are minor (they may even be musically preferable), and they are a testimony to the accuracy of the overall process.

Even more impressive is the total dynamic range of the dbx disc. Figure 2 shows the peak-hold one-third octave spectra for the same first 3:10 minutes of "Billy the Kid" as well as the spectrum for the silent lead-in grooves of the disc (A-weighted to reflect the sensitivity of hearing for low-level noise). In the mid-band, there is a clear 80-dB signal-to-noise ratio for the overall process. Most conventional tape sources come nowhere near utilizing this capability, and only carefully made digital recordings will be able to fully demonstrate this capability. By comparison, the best audiophile product (without dbx) might exhibit a mid-band signal-to-noise ratio of 75 to 78 dB, diminishing to perhaps 65 to 70 dB at high frequencies.

Moving on to relatively recent releases, I note with considerable satisfaction that Crystal Clear Records has made a decision to issue items from their classical catalog in the dbx format. (Not surprisingly, Crystal Clear made safety copies of their direct-to-disc projects on either analog or digital tape, often both, just for such contingencies as this.)

**Sonic Fireworks, Vols. 1 and II.** Richard Morris, organ, and the Atlanta Brass Ensemble. Crystal Clear CCS-7010 and 7011, dbx GS-2021 and 2022.

These stunning albums, released in 1979, have been reviewed in these columns earlier. The dbx versions preserve the quality of the originals with no apparent degradation. And there is a bonus: Because of the lessened demands of low-frequency modulation, greater playing time can be accommodated, and the relatively short sides of the original direct-to-disc versions have been expanded with extra pieces.

Again, the spectral tracking between the originals and the dbx versions is quite good. Figure 3 shows the peak-hold one-third octave spectra for the first two minutes of the "Grand Choeur Dialogue" by Gigout from Vol. 1. Above 1000 Hz, the tracking is very accurate. Below 1000 Hz there appear to be small discrepancies that cannot be easily explained — unless, of course, they represent different takes, which is a distinct possibility.

There is more good news from Crystal Clear and dbx. The Virgil Fox direct-to-disc recordings made in Garden Grove, California, in 1978 have been reissued in dbx format. In my opinion, these are probably the best organ discs ever made, and I have eagerly awaited them in the new format. Here are a few capsule reviews of a number of other dbx discs:

**Stravinsky: "Petroushka," Prokofiev: "Love for Three Oranges" Suite.** Minnesota Orch., Skrowaczewski, cond. Candide QCE 31103, dbx SS-3006. This is an SQ quadrasonic recording which acquires itself beautifully in stereo. Orchestral details are clearly delineated. *Recommended.*

**Strauss: "Dance of the Seven Veils," "Till Eulenspiegel," "Don Juan," and "Rosenkavalier" Waltzes.** Cincinnati Symphony Orch., Schippers, cond. Turnabout QTV-S 34666, dbx SS-3005. This one is a QS quadrasonic recording, and as such shows a slightly narrowed stereo perspective. The overall sound is detailed but warm. *Recommended.*

**Holst: "The Planets."** Saint Louis Symphony Orch., Susskind, cond. Turnabout QTV-S 34598, dbx SS-3002. A beautiful recording — but the quiet passages are marred by a droning noise in the background. Probably the ventilating system. Apart from this, all else is lovely. *Recommended.*

No noise-reduction system is without its shortcomings. Not surprisingly, these are most often apparent when the program input quality is at its most demanding. For example, when a single instrument, in a solo passage, exhibits a wide dynamic range, the background noise level can often be heard exhibiting a pumping sound. When high-pitched massed strings are playing alone, one often hears a rise in low-frequency background noise as the shift in gain structure allows the playback low-frequency boost to emphasize more of the low-frequency noise, which is present in all discs. If a pressing has its normal share of ticks and pops, they will not be generally noticeable during soft passages. However, at mid and high levels, the ticks and pops might become obtrusive. The fluctuation of the noise floor may, in general, bother some listeners more than would a consistent noise floor.

These flaws are relatively minor ones

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for the audiophile who appreciates a wide dynamic range and who has a system capable of handling the range provided by these discs. The thoroughgoing purist may have other views; he may well prefer the consistent noise level of a well-produced and well-processed disc.

John M. Eargle

**Joy of Mozart:** Midsummer Mozart Festival Orch., George Cleve, cond.

**Audible Images AI-107**, cassette, \$17.00.

Performance: C- Processing: A  
Recording: C

This cassette, incorrectly numbered, I believe, since there are two No. 107s in the series, leads with the Mozart Symphony No. 36, "Linz." Side B contains the "Divertimento in D major," K. 136. These are not polished performances and can only be described as those of a journeyman. However, it must be said that this enterprise is reminiscent of the pioneering recording work of Westminster and Vanguard in the '50s.

The hall in which the performances were recorded was very poor; strong resonances color the sound severely. In addition, the "Divertimento" suffers from loud-level distortion which clouds the string sound, and the Linz Symphony is also plagued with distortion in the

tutti, fortes and fortissimos. The effect, subjectively, is to make the dynamics appear far greater than they are in actuality. These defects appear to be in the original recording rather than in the cassette. I used two different speaker systems, and headphones as well, to insure it was not the system itself. Very quiet cassette processing, however.

C. Victor Campos

**Tonwelle:** Richard Wahnfried  
**Innovative Communications KS 80006**, import, stereo, 45 rpm, \$10.98.

Sound: A- Performance: B+

**Floating Music:** Robert Schroder  
**Innovative Communications KS 80001**, import, stereo, 45 rpm, \$10.98.

Sound: A Performance: A-

**Hearth:** Baffo Banfi  
**Innovative Communications KS 80008**, import, stereo, 45 rpm, \$10.98.

Sound: A Performance: C

**Programm 1:** Din A Testbild  
**Innovative Communications KS 80002**, import, stereo, 45 rpm, \$10.98.

Sound: B Performance: B-

Synthesized and electronic music have reached unprecedented levels of mass saturation; in recent years it has ranged from the music soundtracks of PBS' "Cosmos" series and the Mercury

Lynx TV commercials to the synthy-pop and Blitz/New Romantics movement in England with groups such as Gary Numan, Ultravox, Spandau Ballet, et al. But beyond these artists there is a more nearly hidden body of music where synthesizers are used to expand expression past the conventions of traditional melody, rhythm, and structure.

Klaus Schulze is one of the recognized messiahs of these new sounds and expressions, having recorded more than 20 albums and spawning a hoard of disciples over a 10-year period. In furthering his commitment to new music, Schulze has formed his own label, Innovative Communications (IC). Formerly distributed by German Warner Bros., IC recently went independent and has released eight new LPs, four of which I'll review here.

Richard Wahnfried is a guise employed by Schulze to collaborate with other musicians. The side-long pieces of *Tonwelle* (Soundpool) are dominated by insistent synthy-rhythms and Schulze's liquid cathedrals which surround the polyrhythmic drumming of Mike Shrieve (ex-Santana) and the wistful guitar of Manuel Gottsching, a cohort of Schulze's from 10 years past in the group Ash Ra Temple. Their kinetic journeys through architectural spirals of sound are sometimes distracted by the pseudonymed guitarist, Karl Wahnfried, and Michael Garven's brief, atmospheric, and irrelevant vocals, but never enough to derail the trip.

Robert Schroder's *Floating Music* is an impressive distillation of the Schulze influence. His side-long suites are intricate structures of circular melodies, shifting dynamics, and contrasts between the timbres of acoustic- and electronic-sounding percussion and skyscraping whines. All of this creates a vast orchestral landscape of sound.

Two releases by Din A Testbild (DAT) and Baffo Banfi create some interesting contrasts. DAT's *Programm 1* conjures up a nightmarish cityscape of careening electronic sounds and zombie rhythms. They take themselves a bit too seriously in their lyrics, however, and the orgasm that concludes "Urwald-Liebe" is actually ironic humor that DAT misses entirely. *Hearth* by Banfi goes out of its way to be humorous and sabotages some sophisticated electronics with a bump-and-twang funk rhythm section. Whimsy is fine, but do you want to hear a synthetic equivalent of Horowitz playing nursery rhymes?

In order to enhance the reproduction of the synthesizer's inherently wide dynamic range, these IC records are mastered at 45 rpm. The results are more brilliant highs, snapping bass lines, and sharper definition with the sacrifice

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of some playing time (18 minutes per side compared with Schulze's usual 25 to 30 minute sides), and increased wear. The original pure pressings are already deteriorating, and those pops and clicks come around a lot faster at 45 rpm. (IC records are available from Paradox Music Mailorder, 20445 Gramercy Place, Torrance, Calif. 90501.) *John Diliberto*

**Sticky Fingers:** The Rolling Stones  
**Mobile Fidelity MFSL-1-060**, stereo,  
\$16.98.

Sound: A+ Performance: A

For those unaware of what goes between the recording of a piece of music and the playback on your turntable, be informed that the man in the cutting room plays an integral part in the finished product. He takes a raw tape and uses various filters, compressors, and noise-reduction devices in order to make the best possible presentation to his ears. Mobile Fidelity is a company that has given every listener a chance to hear a "second opinion" on his or her favorite disc by using a superior cutting technique (half speed) and the minimum number of gadgets.

What this means is that you get a wider frequency response, a far more dramatic stereo separation, more dynamic range, and a record that sounds

unprocessed and infinitely more "real." On some of their previous efforts this has been quite revealing; for instance, on the Bob Seger *Night Moves* album it is suddenly apparent what a shoddy original recording this was! And The Beatles' *Magical Mystery Tour* and *Abbey Road* shine as gorgeous recordings now, with crisp drums and subtle stereo panning that were lost in the original mastering process.

*Sticky Fingers*, surprisingly enough, sounds like a whole new album. The dense mix now has the definition which allows the listener the ability to easily distinguish between the guitars of Keith Richard and Mick Taylor, to hear almost every lyric Mr. Jagger sings, to feel Bill Wyman's bass on "Can You Hear Me Knocking," and to fully appreciate the drum sound, which is wholly unique and perhaps Charlie's best ever. The acoustic guitars on "Wild Horses" and "Sister Morphine" are richer, and for the ultimate in lush recordings, "Moonlight Mile" deserves turning up all the way — at last. This is the kind of a record your stereo eats up alive, dishing out frequencies that you never thought it had, and although you may find you have to crank the volume more than usual due to the lack of compression, your stereo will sound more like a concert hall than a giant transistor radio.

Now if they only used this technique on all records as they are released, perhaps you wouldn't find so many records sounding great in the studio and terrible on your home system. Unfortunately, most mastering jobs are done with the three-inch speaker in mind — but at least listeners who can afford these versions do have a choice.

*Jon & Sally Tiven*

**Jan and Dean**  
**Audible Images AI-103**, cassette,  
\$17.00.

Performance: E- Processing: A  
Recording: D

This one is really painful, and since half of each side of the cassette is blank, it's a poor value overall. This is a "processed" pop recording with taped drum heads and lousy percussion; it sounds as if your ears were in the damned things. Everything is super-close miked, and limiter distortion is audible — Super Giant Mono.

The music seems to be aimed at people who grew up in California in the early '60s. While the people and music grew up, these guys didn't. And since the singers are not as talented as others from that era, nor the music as good... it fails, except for the processing.

*C. Victor Campos*



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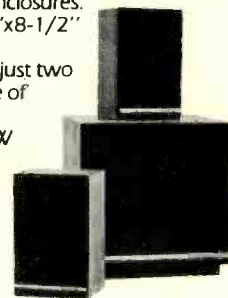
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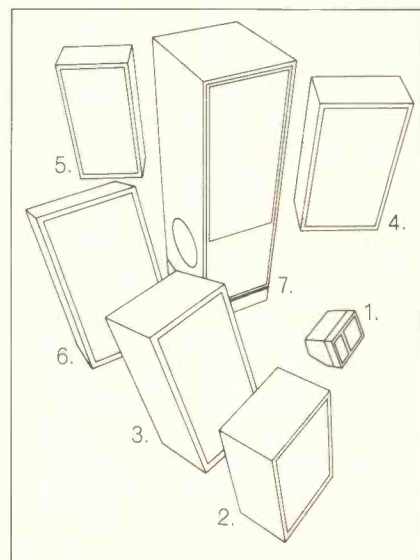
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JON & SALLY TIVEN

**Tattoo You:** The Rolling Stones  
**Rolling Stones COC16052,** stereo,  
\$8.98.

Sound: A Performance: B+

How much sense could one make out of a collaborative effort between Chuck Berry and Smokey Robinson? Not that Mick Jagger is Smokey or Keith B. Berry, but The Stones have always been students of the Motown and Chess schools of music. Rarely has this been so evident as on *Tattoo You*. The initial surge of dynamism that the presence of Ronnie Wood injected The Stones with has leveled off, and they're back to the leisure task of album-making. Whereas *Some Girls* was the album that proved The Stones were still a rock band, *Emotional Rescue* (aside from two excellent singles) wore thin extremely quickly. Now we have *Tattoo You*, which is hardly what you'd term a progression so much as a compromise. No great risks here, no definitive work(s); let's just drag out the outtakes from the last two records and try to make them sound as modern as possible.

The performances are good, particularly Mr. Jagger's vocals and Ronnie Wood's bass — if you haven't figured out by now, the newest member of The Stones was hired as a stand-in for anybody who didn't show up for sessions. Although he's been with the group for over six years, this is only the third album featuring the current lineup (not counting "greatest hits" and "live atrocities"). If this is more or less leftovers from previous sessions, then one starts to wonder about the sluggish output of The Rolling Stones — can they or can they not get it up anymore?

Oh, they sure can! Side one of this album contains some excellent fast rockers, and Mick's moody pieces on the second side should do just fine on the R&B charts. "Black Limousine," which closes side one, is the closest the boys have gotten to Willie Dixon since "Little Red Rooster," and "Neighbors" displays Mick's Jim Carroll imitation (a la "Shattered") in fine style. Keith's "Sweet Little T&A" is sorta cute in a Chuck Berry way, but no "Before They Make Me Run." The Stones have always excelled in delivering what they know radio will play, and as short songs are the ticket these days, why isn't there a "Can You Hear Me Knocking" or even "You Can't Always Get What You Want"?

But you tend to wonder — what



would these guys do if they had to perform a long number? Could they hold your interest? Would they lose the beat? Would they hold their own interest? Perhaps we the public are fickle to want something new from The Rolling Stones with each successive album, but that's showbiz baby. Of course, this is better than *Emotional Rescue* and more worthwhile than *Sucking in the Seventies*, but so is the new one by Z.Z. Top and they never laid claim to being "The World's Greatest Rock 'n' Roll Band." When you sit in that seat, honey, you can't just deliver the goods, you've got to deliver the *greats*, and as likable as it is, *Tattoo You* doesn't.

Jon & Sally Tiven

**The Visitor:** Mick Fleetwood  
**RCA AFL1-4080,** stereo, \$8.98.

Sound: A- Performance: A-

Mick Fleetwood's solo album, *The Visitor*, is an eclectic song collection resulting from his foray into Ghana with bassist George Hawkins and guitarist Todd Sharp. Local talent — namely, The Children's Drum Ensemble, Lord Tiki, The Ghana Folkloric Group, and The Adjo Group — contribute African choral and percussion tracks that are both unusual and pleasing to Western rock 'n' roll ears. Fleetwood should be credited for exposing his predictably massive record-buying audience to rhythmic highlights of a foreign "culchah," although the LP isn't close to

being a far-out "drum record." There are several commercial-sounding tunes on *The Visitor*, as Mick decided to temper the more obscure tunes by enlisting the sure-fire compositions of Peter Greenbaum and Lindsey Buckingham.

The opening track, "Rattlesnake Shake," is a killer blues-rock number written and sung by Peter Greenbaum. If the combination sounds familiar, it's because he did it on the vintage Fleetwood Mac album *Then Play On*, but it's a bump-and-grind masterpiece that begged to be re-recorded. "You Weren't in Love" and "Walk a Thin Line" share the light pop sound that distinguished Mac in its multiplatinum stage, but on this LP the pleasant melodies are laid on top of an African rhythm section. This may sound contrived in the abstract, but as anyone who has recorded in a studio can attest, inspired percussion work can contribute much to the excitement of a track. Fleetwood throws in a cover of "Not Fade Away," as if for anticipated hesitant DJs eyeing the "made in Africa" wax with trepidation. However, he also includes four authentic Ghanaian compositions that give this album not only relief from the more conventional Western songs, but offer the listener a clue as to what drew Mr. Megaplatinum to Ghana in the first place.

Although *The Visitor* may not offer a whole lot of unity, Mick Fleetwood has assembled a highly enjoyable collection of disparate tracks. Perhaps he should tour the world bringing different ethnic musics to his audience with each suc-

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cessive album, and we will be able to look forward to *Mick Fleetwood in Japan* or duets with Ravi Shankar in the future! It's a thought, anyway. *Jon & Sally Tiven*

**Grace and Danger:** John Martyn  
Antilles AN 7081, stereo, \$8.98.

Sound: A- Performance: A-

What a perfect title for an album by the exquisite John Martyn. His feather touch is pure sophistication and sexy as hell. And absolutely not at all wimpy, but strong and muscular. As a guitarist, he is often astonishing. As a vocalist, he is blessed with a smoky haze of a voice he wraps all around and through a song, be it churner or charmer.

His combo here includes Phil Collins of Genesis and Brand X on drums and hazy backing vox, John Giblin on bass, Tommy Eyre on keys and synths, with Dave Lawson on extra synthesizers on three cuts. Engineer Martin Levan produced a bright clarity of sound, propelling the record forward, and also gave it a special presence.

Martyn's music is challenging stuff, neither rock nor jazz, but having elements of both with more of the latter. His only problem is that the album is so good on its own idiosyncratic terms that it'll never find airplay on radio since it fits no category but its own.

*Grace and Danger* is an exhilarating album of truly mature music. *M. T.*

**Jumpin' Jive:** Joe Jackson  
A&M SP-4871, stereo, \$8.98.

Sound: B Performance: B-

Look at the bright side: At least we don't have to listen to Joe Jackson imitate Elvis Costello anymore! As his tal-

ents are in mimicry rather than innovation, Joe Jackson has resorted to aping the sound of the big bands. He does this with some success, actually, given that he is more bandleader here than focal personality and has chosen to perform cover versions of old chestnuts rather than write in this style. The members of his new band are adept players, and in fact Jackson seems more at home here than in his New Wave posturings of albums past.

One could postulate that this radical move to a swinging format may have been prompted by the chilly reception to his last album. Or this could be an unkind swipe at his publishers, who won't receive a dime of royalties from this album as there are no original compositions on it. But Jackson's punk rock career, albeit short lived, reeked of bandwagon-jumping and was preceded by years as a cocktail lounge pianist. Some may see this as an altruistic return to his roots, but it seems silly that someone would use the New Wave banner simply as a springboard to a position where you could make records that sounded like those made during World War II!

If Joe Jackson thinks his move to this format is the next big thing, he may be in for a rude awakening. It's a move that reeks of self-promotion, and Jackson's hipper-than-thou stance (he had the nerve to say "I'm the Man") has dominated his music more than any coherent vision. The only difference between Joe Jackson and the guys who do "sound-alike" records is that he has slightly better taste and . . . he got lucky.

*Jon & Sally Tiven*



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### Give the People What They Want:

The Kinks

Arista AL 9567, stereo, \$8.98.

Sound: A

Performance: A

The social and musical collaboration of The Kinks' Ray Davies and The Pretenders' Chrissie Hynde is an intriguing concept, beyond whatever Rona Barrettesque overtones it implies. Mr. Davies' work (his early work in particular) was an inspiration to fire up The Pretenders' debut album, in that Chrissie recorded "Stop Your Sobbing" and the Ray Davies/Jimmy Page composition "Revenge" with the new handle of "The Phone Call." Now, with Chrissie and Ray working in tandem, as it were, the new Kinks album sounds very much like The Pretenders' first outing, mixed with a heavy dosage of the kind of songwriting that graced The Kinks' pre-Seventies recordings. In other words, this is the best Kinks record in at least 10 years — just as the band is hitting their stride popularity-wise, they've managed to make an artistic comeback as well.

This is quite a rarity in the music business, as most bands struggle for years to make it and finally connect with their audience just as they lose whatever essence made them worthwhile in the first place. Perhaps because The Kinks have been so underexploited in the past, they make themselves exempt from such axioms; how many bands have been around so long with so few personnel shifts and yet sell so comparatively few records? Still, the past 10 years of Kinks records have offered no pleasure and had no progressive increase in sales — perhaps Ray decided to write some real songs to relieve the boredom this time! Aside from an occasional gem like "Apeman," The Kinks have been guilty of dealing out truly duff product, and many old fans, who have given up all hope for this band, can feel renewed with *Give the People What They Want*.

The first two songs on each side hold true to the album's title — better than the usual Kinks singles of late, but Ray's reworking of "All Day And All of the Night" and tribute to FM radio still rate as lesser Kinks kuts. But the descension of his obligatory tribute to Beatle John, "Killers Eyes," is alone worth the price of admission, while "Better Things" is a pretty tune which harkens back to *Village Green* style of melody. There are production, playing, and background vocals that clue the listener in to The Pretenders connection (let me count the ways), but fortunately the songs hold up beyond this. It's no matter that "Bad Boys Get Spanked" reappears here, that the intro radio noise from "Pack It Up" reappears at the start of this album, because if there was no collaboration it would be more bizarre. The rumor was that Ray was going to produce The Pretenders, and it's no doubt that there's a



mutual admiration society going here that doesn't hesitate to blur the borders between the two bands. Give us a break — who knows how far The Pretenders would have gotten without "Stop Your Sobbing" being the hit that it was. Likewise this album might be littered with the shabby contrivances which marred the last Kinks albums, if not for Chrissie.

Enough postulating — this is the only Kinks album worth owning since who knows when, possibly the best sounding album by the group ever, and to be perfectly frank, who knew Ray Davies was still capable of making a record like this? What a waste of time the past decade's been for this geezer.

Jon & Sally Tiven

### Pretenders II: The Pretenders

Sire SRK 3572, stereo, \$8.98.

Sound: B

Performance: B-

Despite its numbered title the second Pretenders album isn't a progression from the first; but more like a slightly messier version of the same. Sorry, fans who enjoyed hours of pondering the last album's garbled lyrics, the group doesn't seem to have developed their songwriting or playing. That leaves the listener with an album which is at best status quo and at its worst, rather disappointing.

Still, even a status-quo Pretenders effort is not to be shrugged off. The opening track displays their trademark heavy-metal or perhaps we should say guitar-heavy rock 'n' roll sound and a dramatic vocal whose prominence in the mix gives a clue about the slant of this LP. For even though the songs are weaker than those on the last album, the force of Chrissie Hynde's personality is considerably greater here due to her super-emotive delivery and clear enunciation. If attitude is the central ingredient of a rock performer (and that's not saying she isn't also a powerful singer and good writer most of the time), Chrissie would get an A for this album despite her apparent dormancy in composition.

The highlights of *Pll* are the tunes cowritten by Chrissie and James Honeyman-Scott, "Pack It Up" and "Day After Day," and the Hynde-penned ballad "Birds of Paradise." It seems that the

group was hurting for material and decided to try some song types onto which they could just graft words. Hence the half-hearted reggae and soul numbers ("Waste Not Want Not" and "Louie Louie" respectively) and the gimmicky single "Bad Boys Get Spanked" whose whip cracks and screams prove that this group can be as silly as they are sometimes moving. Six of these tracks would have made for a meaty EP, and those who bought their last disc don't need another copy of "Message of Love" and "Talk of the Town," thank you very much.

It is well established that Ms. Hynde is not a prolific songwriter, and with that in mind one would think that they would have taken more time to write for their second long player. Instead we get a rush job with approximately half of the material living up to The Pretenders' standard of quality, and the rest barely even qualifying as filler. One would tend to postulate that the absence of group compositions on this album, as opposed to the greater participation of the rhythm section in songwriting last time around, indicates that there is less of a band mentality to the Tenders these days. Hopefully, the next time out there will be a Pretenders around, rather than just the Chrissie Hynde Group this album seems to resemble. This isn't a horrible album, mind you, but everyone including the band knows that The Pretenders are capable of much, much more.

Jon & Sally Tiven

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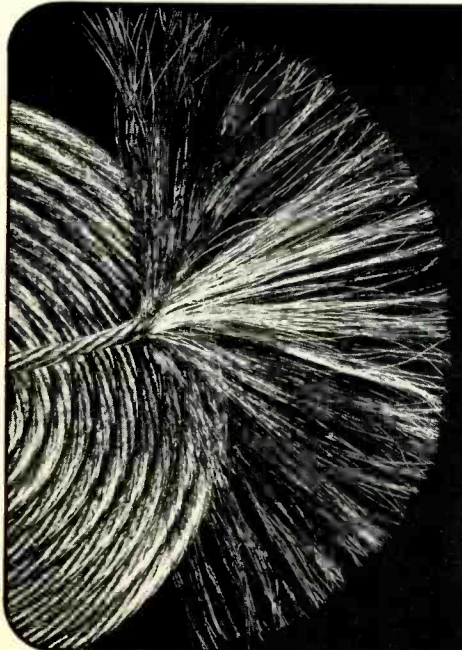
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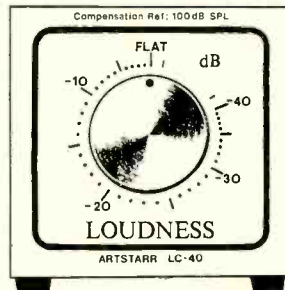
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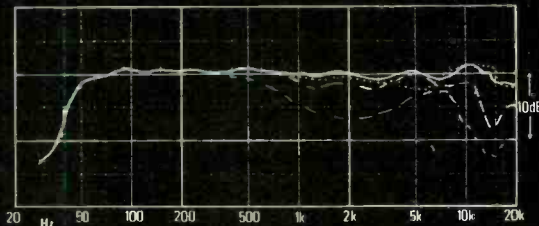
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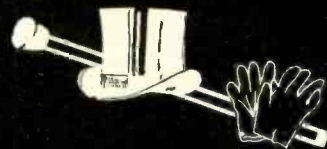
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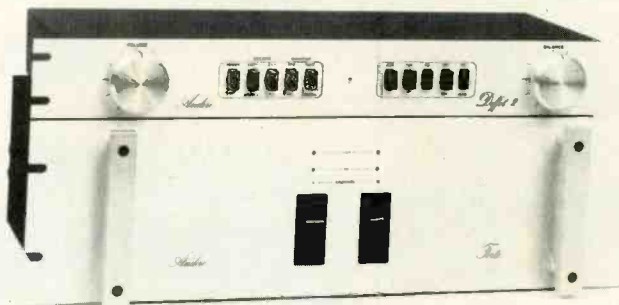
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**M**ost people who assemble a stereo component system usually start out with a relatively modest outfit. With extensive listening, their critical faculties generally become more acute, and this usually leads to a continual upgrading of the quality of their systems. Some people, hopelessly smitten with the delights of high-quality sound, throw financial constraints to the wind and acquire a stereo system with a very high level of sophistication. Whatever the quality level of their sound systems, if these people regularly attend classical music concerts, they are familiar with the experience of listening to live music. Thus, it doesn't take them very long to recognize the inadequacies of their systems, no matter how good the system might be in comparison to the concert hall experience. They realize there are some vital elements missing in the sound of the music reproduced in their home listening environment. While we may be a long way off in developing the technology which will completely simulate the concert hall listening experience in the home, modest beginnings have been made in that direction. For some time now, we have known about a method of sound processing which provides us with a fairly significant quotient of that elusive concert-hall sound in the home listening situation. I refer, of course, to time-delay and ambience enhancement technology.

The time-delay devices currently on the market are either of the analog type using BBD (so-called "bucket brigade") chips or the delay line, or digital delay systems. Both types of units usually feature variable delay times ranging from 10 to 100 milliseconds and a means of multiple recirculation of the delays to create reverberation. Both units also have advantages and disadvantages. The main problem with most analog delay systems has been their poor signal-to-noise ratio and the artificiality and spurious colorations of the synthesized reverberation. With one exception, the digital delay units have also had noise problems in the area of quantization noise, plus unnatural sounding reverberation. Nonetheless, a properly set up delay system can effect a dramatic increase in the perceived naturalness of the recorded sound.

Benchmark Acoustics of New York City has introduced its new Model ARU



Ambience Access System. The invention of Francis Daniel, a bright young recording engineer with a broad knowledge of acoustics, the ARU is particularly well engineered and one of the most effective devices of this type I have encountered. Daniel stresses the fact that his unit is an ambience recovery system that does not employ ambience "synthesizing" in any way. His system is based on the well-known fact that all recordings have "hidden ambience," out-of-phase signals of long and short delays of incredible complexity. How much of this ambience is in a given recording depends on the nature of the recording locale, the kind of microphone techniques employed, and the skill of the recording engineer in capturing the acoustic characteristics which enhance the realism of his recording. The ARU is comprised of two units. The main unit is a slim, attractively styled enclosure that has a mode switch, a rear balance control, a side balance control and a "null" control whose function I will explain shortly. There is also a 10-segment LED display labeled "cross-correlation" which is a measure of the out-of-phase information. The higher this display reads, the more ambient information is in the recording. The remote control module is supplied with 25 feet of interconnecting cable, with longer lengths optionally available. It

has a master level control, side and rear level controls, and a control labeled "Lo-Fill" which will also be explained.

The main unit of the Model ARU is preferably installed between a preamplifier and power amplifier or in a tape monitor loop, although this latter manner of use will degrade signal-to-noise ratio. While there is no processing whatever of signals to the front speakers, purists will be glad to know that by means of a "Y" connector on the output of their preamplifier, they can avoid interposing the unit between their preamplifier and power amplifier. However, in so doing this, the master level control on the remote module will lose part of its function. As with most time-delay and ambience systems, the ARU delivers its signals to a second stereo amplifier and speakers located to the rear of the listener. For optimum performance, the ARU goes a step further by enabling the use of a third stereo amplifier and a pair of side-mounted speakers. This unit is an analog ambience recovery system, and Daniel uses the latest Matsushita (Panasonic) BBD chip for his delay augmented by a clever compansion and pre- and de-emphasis circuit which affords a signal-to-noise ratio, in both the rear and side channels, of almost 80 dB. This is considerably quieter than previous BBD designs of this type. Operationally, the

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synthesize, out-of-phase  
ambience signals.**



*The Benchmark Acoustics Model ARU  
Ambience Access System.*

ARU feeds the ambient information to the rear channels out of phase, and it is delayed by 30 mS; this assures maximum noncoherent signals in the rear channels. The "Lo-Fill" control now comes into play, extracting mono information below 60 Hz, and this is also fed to the rear speakers after the same time delay as the out-of-phase information. The combined effects of the time and spatial dispersion of the very low frequencies is subjectively perceived as a large increase of bass. The side channels are fed differently. They receive the left and right channels of the stereo signal, then delayed by 30 mS, thus enabling the ear to largely ignore the direct sound and instead detect the original ambience in the source. It goes without saying that the rear and the side power amplifiers and speakers can be very modest in power and size and that quite a number of possible layout configurations can achieve good results in a variety of listening rooms.

The "Null" control is used to obtain a minimum volume of sound in the rear speakers. This adjusts the cross-correlation circuits for maximum extraction of ambience from the source recordings. In use, the rear speakers are adjusted first for L/R balance and level in relation to the sound levels of the front channels, and then the level of the side channels is blended into the sound field. A certain amount of interplay between the speakers takes place, and one rapidly becomes proficient in achieving satisfactory balances; this adjustment is made all the easier with the remote control. The increase in the realism of the music using just the rear channels is very convincing. Given a recording made in a fine concert hall with simple microphone techniques (like a Blumlein coincident

pair), the recreation of the large acoustic space of the hall through the six-speaker array and the subsequent increase in realism is quite simply breathtaking. Benchmark's ARU Ambience Access System is priced at \$829, and the company is located at 201 West 89th St., New York, N.Y. 10024.

Monster Cable, well-known for their highly regarded heavy-duty speaker wire, has branched out with a whole line of new cables and interconnect hardware and other audio accessories. These interesting and practical new audio connectors are called Powerloks, and essentially they are heavy, machined (rather than stamped) banana plugs of the single-terminal variety. These gold-plated units have an expandable-collet locking system. When the plug is inserted into the female receptacle, a turn of the knurled grip on the top of the plug expands the spring fingers of the plug and internally locks it in place. A locking device on the top of the plug accepts large gold-plated spade lugs which can handle wire as large in diameter as the firm's Monster cable. No price has been announced as yet. Less elaborate, but nonetheless useful, is the Super Monster Tip. Again, this is a single banana plug, gold-plated, with heavy spring fingers. Large diameter wire can be attached by a special crimping tool, available at Monster Cable dealers, who will also cut Monster cable to any length and install these tips, plus special grips and strain reliefs.

IMF Electronics Inc. of England, a speaker manufacturer heavily involved with "Ambisonic" surround sound recording, has evidently decided to meet the dynamic challenges of the digital era with the introduction of their Special Applications Control Monitor speaker. This does not replace their well-known Reference Monitor Four speaker, though it is akin to it but has heavier duty drive units. The midrange and tweeter are separately mounted on top of the main speaker enclosure and are phase aligned. During a demonstration, they certainly had a big sound output while sounding extremely linear. The company is continuing ambisonic experiments, and I have been promised a recording of the Royal Wedding made with the Calrec Soundfield mike. I actually spotted one in St. Paul's during the video broadcast of the wedding!

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er zoom which can also be controlled manually, with the GL-PO6u wide-angle and the GL-P15u tele as options.

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## Sharp Video Recorder

The XA-600 is a lightweight, portable unit featuring two-hour record/playback capability, simplified insert and assembly editing, variable slow-motion and still frame, Automatic Program Search System (APSS), and soft-touch solenoid controls. Insert editing allows the insertion of new material at the beginning or middle of an existing program, such as when adding titles or credits at the start of a program or when adding illustrations

to bridge existing scenes. Assembly editing enables recording of an individual scene, taking a break, and then adding the next scene with minimal disruption. Pressing the APSS button permits skipping ahead to the start of the next selection or back to the start of the last previous item. Other features include an auto rewind system, three-stage battery discharge indicator, three-way powering, one-touch recording, etc. Price: \$1,250.00.

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## Pioneer Projection TV

The LS-501 is a single-unit projector-and-screen television with a 50-inch screen. There are three inputs to handle regular TV, videocassette, and videodisc without changing input leads, and the 12-channel electronic tuning keyboard is duplicated by an 18-position wireless remote control, which also handles volume, muting, and power on/off. Price: \$3,300.00.

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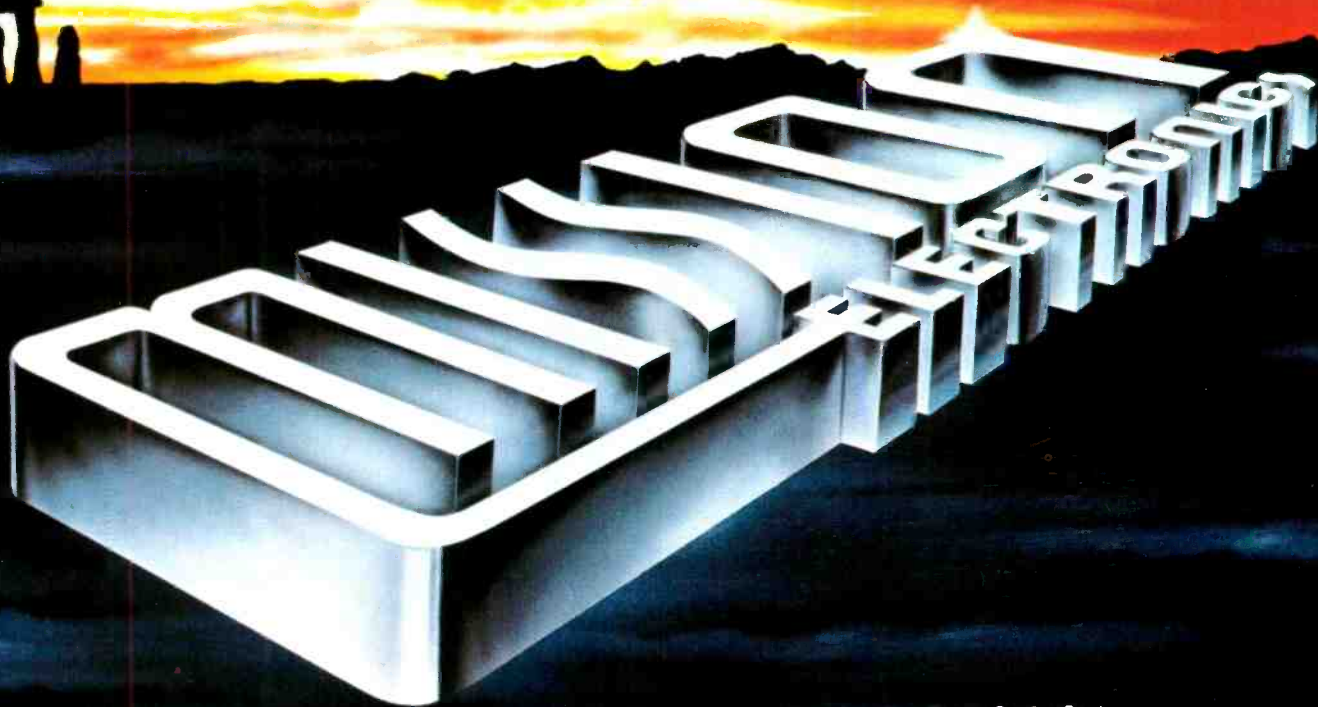
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