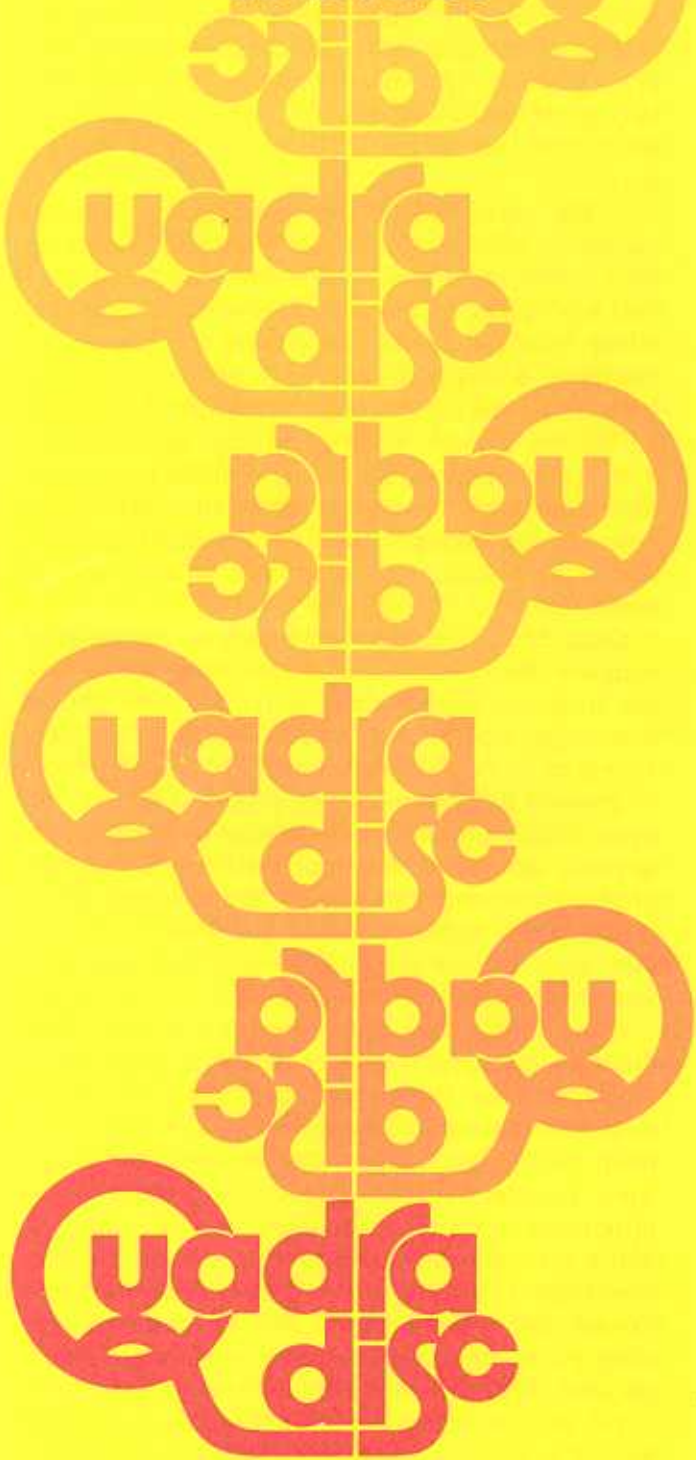


ABOUT QUADRAPHONICS
AND THE NEW, DISCRETE,
FOUR CHANNEL
QUADRADISC



WHY QUADRAPHONIC

Edward Tatnall Canby

"Four loudspeakers? New tape and record players—what next?" That is a common reaction to the first news of quadraphonic sound. After all, your present stereo system works well and sounds fine. Is quadraphonic just one more gimmick, like peddling Cadillacs in pairs? Our answer, of course, is no.

In the early 1950's, the home music industry survived a similar changeover, doubling everything from mono to stereo. "What—two loudspeakers? And one makes all the sound I need! A double amplifier—how redundant can you get?" Remember? Yet today, a very high proportion of all home music is heard in stereo, there are few mono recordings left on the market, mostly historical reissues, and it is virtually impossible to buy a mono music system much larger than a transistor radio. Stereo has won our confidence. Now comes quadraphonic, and it is a logical development straight out of stereo itself.

Quadruplic is not a rich man's toy, as you may suppose. Early installations have been expensive (as in early stereo), inevitably. But you should know right now that *quadruplic sound is best suited to home listening rooms*. Your living room is where it blooms most easily—and it is less, not more, choosy than present stereo when it comes to room variations. The four distributed channels produce a sound that is very nearly independent of the room itself, and thus you have a realism that can remove your four walls and take you straight into another sonic world.

That sounds like exaggeration. It is no more than the truth. One could cite a thousand facets of listening experience, according to the variety of material already available in this form. You will find everything from first-line pop to Persichetti and Puccini, from dragster races and (yes!) ping pong, or alternatively a fourway (doubles) tennis match, to music for synthesizer. And there is Bach, Beethoven, Mozart, Vivaldi. Every area has its own new values. And keep in mind that all quadruplic discs are compatible. They play as standard stereo (or even mono) on all presently existing equipment.

We do not automatically appreciate each new kind of sound, such as quadruplic, on first hear-

ing. We must, to an extent, learn to listen to it. No fancy academic courses. We learn as we are entertained. Thus a dozen years ago, many people could not hear any difference between mono and stereo (like people who can't tell a Ford from a Chevrolet). Now, those very same people generally find stereo natural and "right," whereas an old-type mono recording seems to lack impact, with an unnatural, squeezed kind of effect—however excellent its content. There *is* a lot missing, as our ears now rightly tell us.

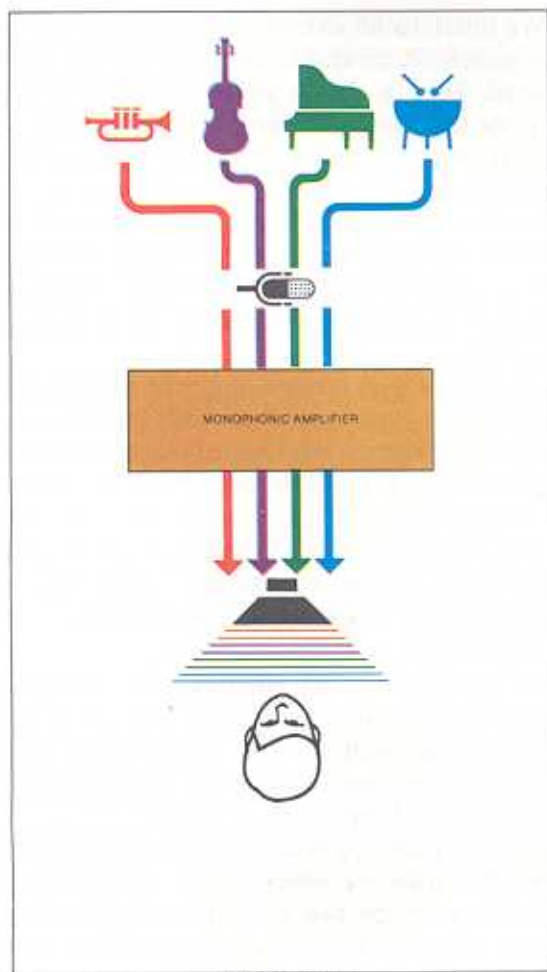
Those of us who have already been listening to quadruplic have come to feel the same way about stereo. For us, the lack of active sound from the sides and back of the room has a kind of passive, dragging effect, as though half our system had unaccountably died. Are we spoiled? Perhaps, but we have simply learned to "read" the more ample quadruplic message, as you have learned to read stereo.

Take an illuminating analogy. The old single-channel mono sound is comparable to a single strong electric light in your living room. All the light comes from one source. With good placement, with the help of diffusion and reflection, you can light up your room quite successfully. Not, however, with much versatility. Much better, perhaps, to use two lights, perhaps two good lamps placed apart in the most active area of your room. That is more or less equivalent to stereo sound. Not more light—better, more controlled and versatile light. You can see more, do more; a fundamental improvement!

Part of your room, however—to continue the analogy—is still inactive, merely reflecting light from the actively-illuminated area. Via bright walls and a white ceiling, you may have a very well-lighted room. And yet—? Why not light up the whole space actively? More separate light sources, for maximum usefulness. Most of us have long since done exactly this with our living rooms. Now let us see what quadruplic sound can do for living room sonics.

MONO

The old mono sound, recorded and reproduced via a single channel of information, was the only sound we knew during some eighty years of recorded history, from the original tinfoil cylinder phonograph of 1887 through the long-play disc of 1948 and the advanced sound of hi-fi magnetic



MONOPHONIC

tape in the 1950's. It was a long, fruitful development and the late mono sound of the 1950's still rates as superb hi-fi by any standard.

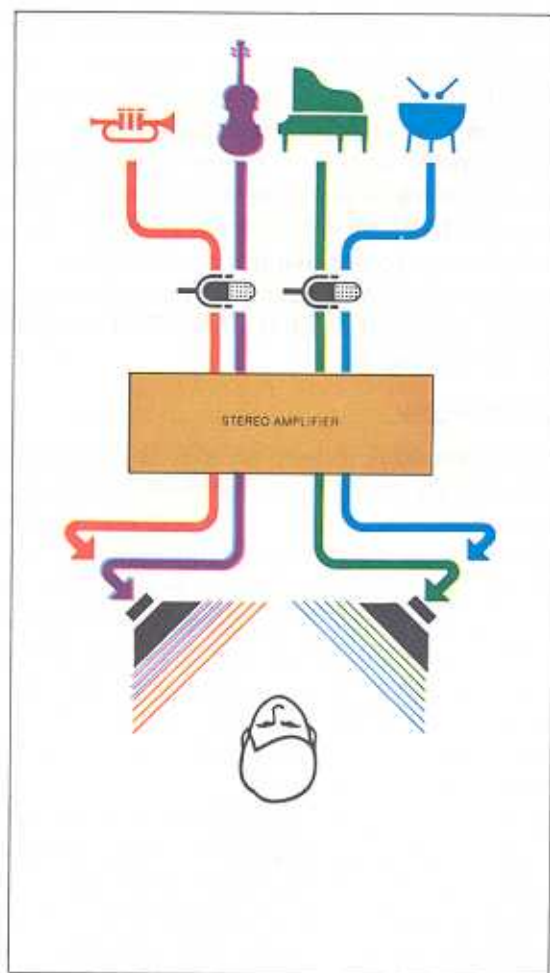
But the mono system has limits, not unlike those of the single electric light. Like a flat picture, mono has no dimensions, except that of near and far—these is no left, no right; all the sound comes from everywhere. We *infer* dimension, as we do in a picture that is flat; and that is good. By spreading out that single sound source, via living room reflection from walls, chairs, pianos, Venetian blinds, we can give our ears a sense of space—we can actually hear the sound of a concert hall. Imagination can do wonders, when the music itself is inspiring. We should never scorn the mono art, for it brought us a wealth of fine experience.

And yet, it did not give our two ears enough material to work on. By nature, our ears are designed to hear *two* messages at once, minutely

different, and to derive (as with the two eyes) an extraordinary array of subtle information from those specific differences. The random room reflections of mono helped satisfy this need, but the effects were, so to speak, purely accidental. We could do better than that.

STEREO

And so we came to stereo. Its two channels of simultaneous information did more than merely double the sound. For the first time, there were actual, *recorded* differences between *two* sounds, millions of differences of the sort that our ears could "decode" into actual dimensions. And into a more realistic space.



STEREO

First, we could locate specific points of direction. Not merely out of each speaker, right and left, but actually at an infinite number of points *between*

the speakers, and out beyond them to each side. We could create an entire "curtain of sound," the spread of an actual orchestra, a pop group, an opera stage, all the way across the front of our listening space. There was left and right, and all points between. (Early stereo demo discs stressed "A-B" sound out of the two speakers, the ping pong effect, but that was a misguided use of stereo subtlety, as we soon learned.)

Second and just as important, we could enhance the immediacy of the space around our music, the feeling of an actual hall or room, out beyond the living room wall. That is because our perception of such spaces also depends on tiny two-eared differences, differences at each ear in the mass ambient reflections that constitute the liveness or reverberation inside a hall. We decode these into the feeling of enclosed space. In mono, we "faked" the effect. Now we could actually project real tiny differences, via the two speakers, to provide a stronger, more accurate range of space clues. Hence the more realistic sense of being *there*, in another and much larger space, which stereo uniquely brings to our living room listening.

Not only more information, but new kinds of information, over and beyond mono. That is what the stereo system did for us.

QUADRAPHONIC

Quadraphonic is indeed an extension of stereo. But if it merely doubled the channels in the same configuration — i.e., four loudspeakers lined up across the front of your listening spot, we would have only a marginal advantage. Three-channel and later, four, eight and sixteen channel recordings have been common in the recording studios since the late 1950's, but they are mixed down to two for stereo home use. Spread out in a line, three or four channels do offer some improvement in stereo detail. Like a sharper picture.

But, there is an immense difference between that and our present quadraphonic sound, which is *surround sound*. It is no longer confined to one front wall, with only a passive mono-style reflection from the rest of your room. Now there is active sound from every direction. Four active walls, if you wish. We still hear stereo out of the same front two speakers. But we have added more stereo, not twice as much but *six* times as much. Four loudspeakers and active stereo interaction *between all*

of them, the front speakers, the pair in the rear, the side speakers, and the two diagonals. Every speaker is a stereo pair with every other speaker, all simultaneously. An extraordinary enlargement of information.

But wait! Who wants all this surround sound? Isn't most music, and particularly classical music, entirely up front? Why add a symphony in the rear? Or on the sides?

The answer is that though actual "live" sound sources—the music—may be in front, as in a concert, a large part of such sound reaches us by reflection, bounced off spacious ceilings and distant walls, behind you as well as from every other direction. Reverberation, which gives us the sense of space, by its very nature, comes from every direction. Yet, remarkably, we still can hear the music itself where it belongs. The ears easily sort out the sonic complexities. Direct sounds, arriving first in a straight line, determine the basic *direction* in which you hear. The later (milliseconds later) reflections, from all around, determine the *space* you hear. Even the synthetic reverb of pop music works the same way.

Via quadraphonic's four surrounding loudspeakers we can now reproduce *all* these effects, to suit our needs. We can place a big space all around, in front and even far back in the rear. But we can also keep the music itself entirely up front.

We also can produce specific direct point sources, just as in stereo. But now they may extend 360 degrees, all the way around. And, again, not only at the four speaker locations but in between them. By freakish good luck, we have even found we can place sounds seemingly *overhead*, as though we were inside an inverted sonic bowl. We don't have to! We have a choice. But these new directional impacts are already being put to imaginative use.

Thus we have an immense new range of effects, *over and beyond stereo*, which are available to use—or not to use—as we wish. Good taste is the same in quadraphonic as elsewhere. We have an enormous *choice*, from very conservative to ultra-far-out. Some classical quadraphonic may do nothing more radical than extend the concert hall more realistically around and behind you, with the music precisely where it has always been. On the other hand, there are already classical quadraphonic recordings in which you will find yourself in the middle of the orchestra—brass to your right, per-

haps, strings on the left, percussion to the rear and winds up front. The conductors don't enjoy it since they must spin like tops to face the musicians all around them. But the quadraphonic impact in the home is a wholly new "translation" of concert music into the home listening environment and it is both interesting and important. In non-classical music, directional effects are common-place and there is no strong "up front" tradition to inhibit experiment. Yes, the new medium is enormously flexible. Far beyond mono. Far beyond present stereo. What more?

Only that, as a sort of by-product, the quadraphonic system can do interesting things to *standard* stereo discs when they emerge through four speakers. The effects are random, not built in. But you will never have less than you had before, and often you will get more out of your plain stereo recordings, played in what we might call pseudo-quadraphonic. Very useful, while you are building up your library of true quadraphonic discs.

COST

Does quadraphonic sound cost double? Not necessarily.

As technological improvements come along, our channels cost less, and take up less space. Note that today's two-channel components are much smaller than their bulky mono equivalents of years back. New miniaturization, solid-state technology and the integrated circuit "chip" (a fingernail-size unit incorporating dozens, even hundreds of electronic elements) mean that even four channels are easier to produce, and in far less space, than the single channel of mono times.

The four loudspeakers would seem to be an irreducible factor. And a doubled space-eater! But even the loudspeaker bows to progress. The cost does *not* double, nor even the space requirements, from mono to stereo nor from stereo to quadraphonic, because of the very potency of these more advanced systems. The stereo enhancement of effect, the further enhancement via quadraphonic, results in an apparent enhancement of sound quality, speaker for speaker. *Your speakers are better instruments* in stereo pairs than singly, and even better in quadraphonic fours than in pairs. It is always thus when our senses find themselves newly gratified.

You may easily put this to advantage. If you buy two more loudspeakers to match your present

stereo pair, you will end up with much improved over-all sound, as you hear it. Alternatively, you may acquire less fancy and/or smaller speakers and find that in quadraphonic you have just as good sound as at present. Four smaller speakers can easily equal two bigger ones. (And in fact collectively, they produce deeper brass than any one of them could alone.)

We expect the economics of quadraphonic sound will work further to reduce the unit cost as the new system finds its way into more and more homes and multiple space-saving speakers become common.

Before long, we think, quadraphonic sound will simply be hi-fi sound, just as two-channel stereo has been in recent years and, before that, quality mono. Quadraphonic is the present and future state of the art—and that is what hi-fi has always been.

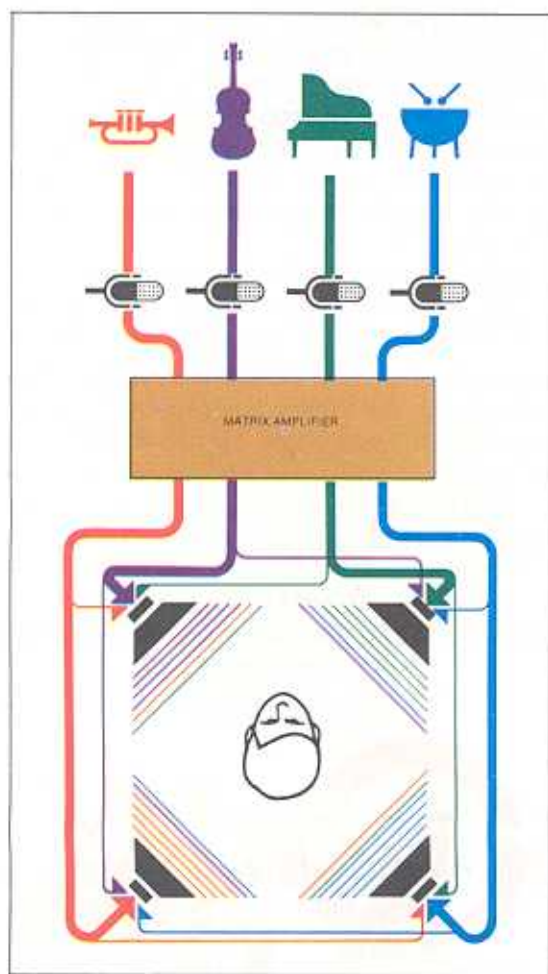
ABOUT
WARNER, ELEKTRA AND ATLANTIC
QUADRADISCS
by Ivan Berger



Welcome to *true* four-channel sound—music the way it was meant to be heard!

The Warner, Elektra and Atlantic QUADRADISC is a stereo-compatible quadraphonic record. Play it on a normal stereo (or even monophonic) phonograph, and it will sound like a fine stereo (or mono) record. But play it through a four-channel system equipped with a CD-4 discrete demodulator and cartridge, and you'll hear it in full, breathtaking discrete quadraphonic sound.

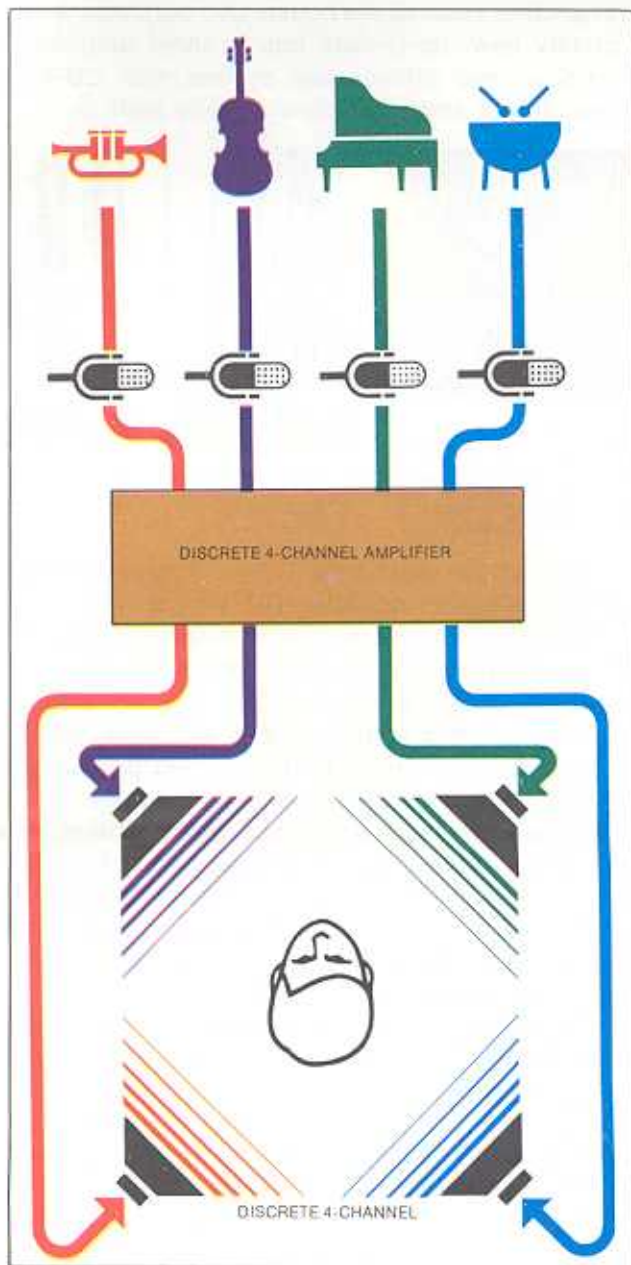
That's because QUADRADISCS carry the sum of the right and left front and back signals on the normal groove wall. Therefore, when you play a QUADRADISC record on a stereo phonograph, you will hear both the left front and left rear signals coming from your left stereo speaker and the right front and right rear signals coming through your right speaker.



MATRIX

But QUADRADISCS carry not only these two *combined signals*, but also two other signals that are never audible. These "carrier" signals control your CD-4 channel demodulator, telling it instant by instant just how to reconstruct the original four discrete signals so that each speaker of the four-channel system will produce *only* the signal it is supposed to reproduce.

That's important. Because, if each speaker is haunted by ghosts from other channels, the sound perspective becomes blurred, and you can't really capture all the spaciousness, all the sonic excitement and brilliant intensity the artists and engineers intended you to have. Other four-channel record systems (called "matrix" systems) have this ghost problem built-in, even when they are "assisted" by elaborate enhancing circuits designed to mask the problem.



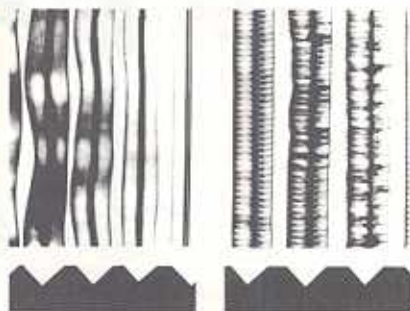
DISCRETE 4-CHANNEL

What equipment do you need to play the QUADRADISC? If you're only interested in playing it as a stereo disc, your present stereo system will do fine. You can play it as long and as often as any other record you own, and you'll never miss a note. Whenever you're ready to move up to true quadraphonic sound, all you'll need is a CD-4 demodulator and CD-4 cartridge with Shibata-type stylus, two extra speakers, and two more channels of amplification. If you prefer, however, you can preserve your current stereo system, putting it

in another room of the house, and purchase a completely new, up-to-date four-channel amplifier or receiver and phonograph system with CD-4 demodulators and cartridges already built in.



COMPARISON OF CONVENTIONAL ELLIPTICAL STYLUS (BLACK) TO SHIBATA-TYPE STYLUS (RED). SHIBATA-TYPE TRACES MORE OF THE GROOVE INFORMATION AND PLACES LESS TENSION UPON THE DISC SURFACE.



GROOVES AND CROSS-SECTION OF CONVENTIONAL STEREO RECORD

GROOVES AND CROSS-SECTION OF CD-4 SYSTEM RECORD

Getting the most from CD-4 discrete records is a simple matter of giving CD-4 records the same care your stereo discs should be receiving already. This means cleaning your stylus (needle) and records carefully before each playing with the special brushes your record dealer sells, keeping a dust-cover on your turntable, and putting your records back in their protective inner sleeves and jackets when you're finished playing them. It is advisable to store all types of records in an upright position, away from sunlight and heat. Following these simple guidelines will make your entire record collection sound better and give you many years of listening enjoyment.

The technically curious and sophisticated music listener who desires more information can write to us for a detailed brochure entitled "Everything You Always Wanted to Know About the CD-4 Discrete Disc." Send your request to "Discrete Disc," 13th Floor, 15 Columbus Circle, New York City 10023.

A SPECIAL NOTE: RCA Records is also pioneering in the production of CD-4 channel discrete *quadradiscs*. For the best in four-channel sound on disc, look to Warner, Elektra, Atlantic, RCA and other enlightened companies who are already bringing you quad music in its most perfected disc form.

Published by the Joint Technical and Engineering Committee of Warner, Elektra and Atlantic Records as an information service to the public.