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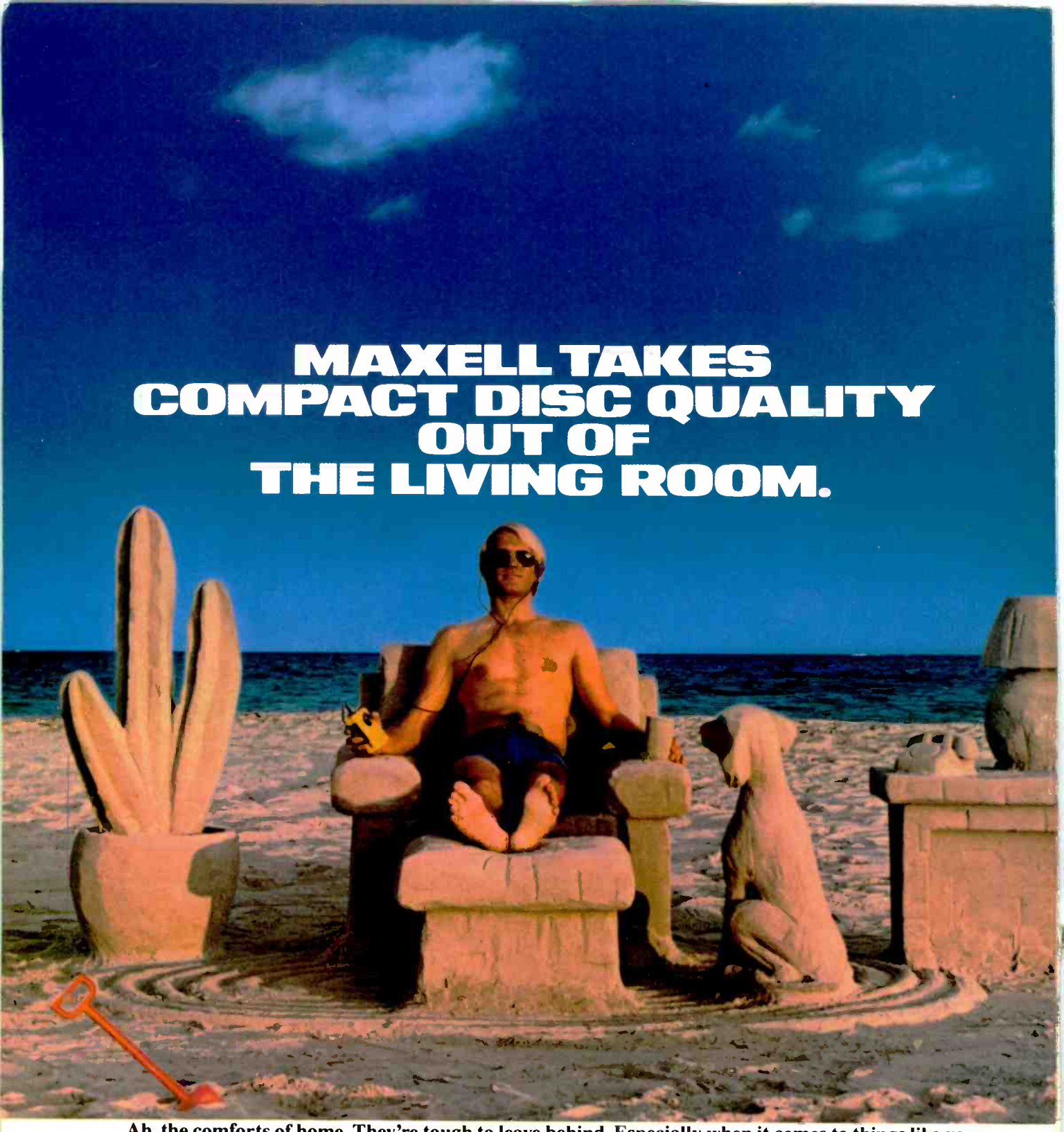

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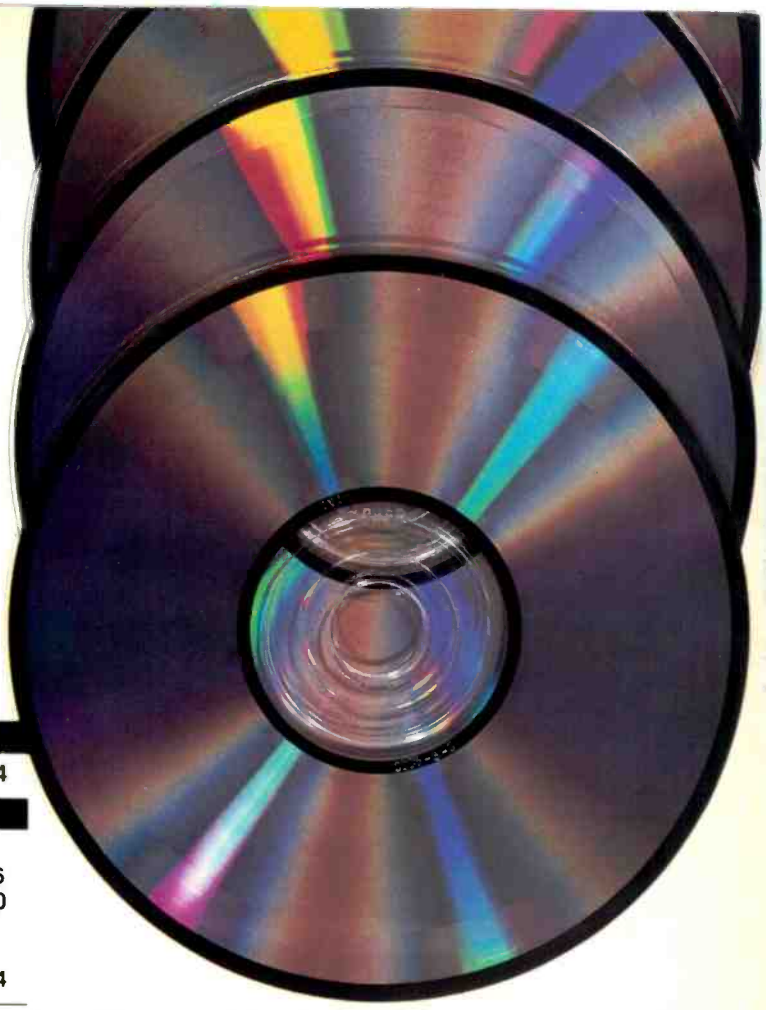
Audio COMPACT DISC '86



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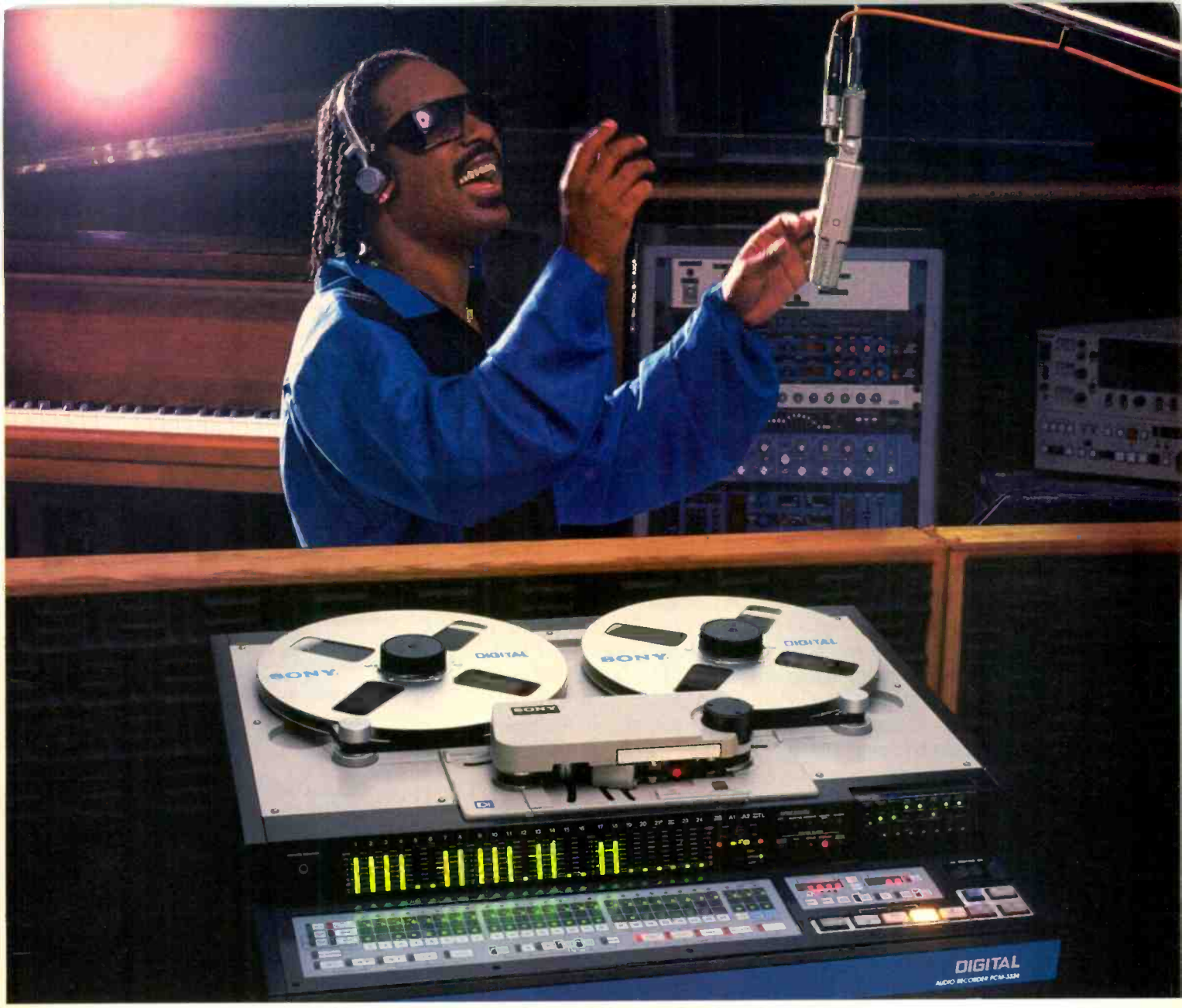

To hear why Stevie Wonder records on Sony Digital equipment, play him back on a Sony Compact Disc Player.

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But whichever Sony Compact Disc Player you choose, each allows you to hear everything the artist originally intended.

Shown is the CDP-302, a full-featured, programmable home player that uses Sony's third-generation digital technology.

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OVERVIEW

Finding up-to-date, authoritative information on Compact Disc players and recordings is difficult, even if you're the editor of an audio magazine and can go straight to the horse's mouth. However, if you're a consumer, it is almost impossible to find a single source of good data, one that is accurate and unbiased. Because of this need by audiophiles, we decided to prepare just such a publication; *Audio Compact Disc '86* is the result. We think you'll like it and know you'll find it very useful.

In these pages there are 18 test reports—complete and in-depth—of current Compact Disc players. All of these players are presently on the market or are just being introduced. In the 80+ pages of reviews, you'll find such technical milestones as Pioneer's CLD-900, which plays both Compact Discs and LaserVision videodiscs. Alpine's car CD player is covered. You'll find a report on the latest portable CD player, the SL-XP7 from Technics. Len Feldman, *Audio* magazine's Mr. Digital, tells all about the features of each machine and presents the industry's most complete set of measurements on each player. Feldman is uniquely suited to being CD Test Editor since he has reviewed more players than anyone else in the field.

Also included is "A Compact Introduction to the Compact Disc" by *Audio* magazine's Technical Editor, Ivan Berger, and Hans Fantel, audio columnist for *The New York Times*. This feature article gives the basics of this new program source. Also good for the odd bit of information is another feature, "Living with CDs," which is based on a series of 22 seminars Feldman gave all across the country.

Disc reviews? Plenty! More than 50 pages worth. Lots of them are brand-new reviews, published here for the first time, while many of them are reprinted here from earlier issues of *Audio*. Even if you've had a CD player for some time, these older reviews are, in our opinion, important in finding one's way through the increasingly large number of CDs available now.

What else is in *Audio Compact Disc '86*? An excerpt from *Audio*'s Annual Equipment Directory, offering specifications and features on all the current Compact Disc players and digital processors, together with a listing of makers' names and addresses.

All in all, there are more than 150 pages of editorial material in this package. If there is anything else you'd like to see, please let us know—it would probably make a good item for a future issue of *Audio*.

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Editor

Audio

Eugene Pitts III
Editor

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The new ADS CD3.

A COMPACT INTRO TO THE COMPACT I

IVAN BERGER and HANS FANTEL

While more and more new phonograph records and cassettes are made from digitally recorded master tapes, these records and tapes are analog recordings—which is why they're playable on ordinary turntables and tape decks. The one purely digital system commonly available for home use is the Compact Disc or "CD."

The CD itself is a rainbow-silvered disc of plastic only 4.7 inches in diameter—smaller than a 45-rpm "single" record. It's not played by dragging a needle along a groove but by reading its information with the pure light of a laser beam. Because light beams cause no friction, the disc won't wear out or deteriorate no matter how often you play it. It yields better sound than even a brand-new LP or tape, and far, far better sound than tapes and records that have been played a lot. Besides, the Compact Disc is the most convenient and efficient sound-storage medium ever devised.

It's also a most unusual medium. Physically, the only things that CDs and LPs have in common is their shape. The information recorded on a CD is not engraved on its surface, but sandwiched between an upper layer of lacquer, on which the label is printed, and a layer of tough, transparent plastic which forms the bottom of the disc, and through which the player's laser reads the information. The laser is not guided by a physical groove, the way a phonograph stylus is, but by a computer-operated servo mechanism that analyzes the data coming off the disc. The servo senses when the laser is beginning to mistrack, and adjusts the laser's aim accordingly.

While you can see an LP record's grooves, the CD's signal path is too fine to be directly visible, except under very high magnification. A CD has more than 15,000 information lines per inch, about 60 times as fine as LP grooves. Uncoiled, a CD's signal path would stretch about three miles, versus about a quarter of a mile for an LP's groove. The LP turns at a constant speed (33⅓ rpm), which means its information density varies, spread out at the longer, outside groves and densely packed at the smaller, inside ones. The CD's rotational speed varies, from 500 rpm at its innermost diameter to 200 rpm at its rim, to keep the information density as uniformly high as possible. (Incidentally, a CD track begins at the center and spirals out to the rim, just the opposite of LP practice.)

And since the CD is a true, digital medium, the information it carries is not the LP's continuously varying groove but a stream of ones and zeroes, represented on the disc by tiny pits that cause minute variations in the reflections from the laser beam.

What's on the Discs

Thousands of CDs are now available, something for every imaginable taste. This sounds like a lot, but it's actually just a drop in the bucket compared to the number of LP records (more than 50,000) or prerecorded cassettes available. A glance into any record store will show you that—but then, cassette has a head start of some 20 years, and LPs have been around even longer. Even so, the number of available CDs is growing fast, and virtually every record company you've ever heard of now offers at least some.

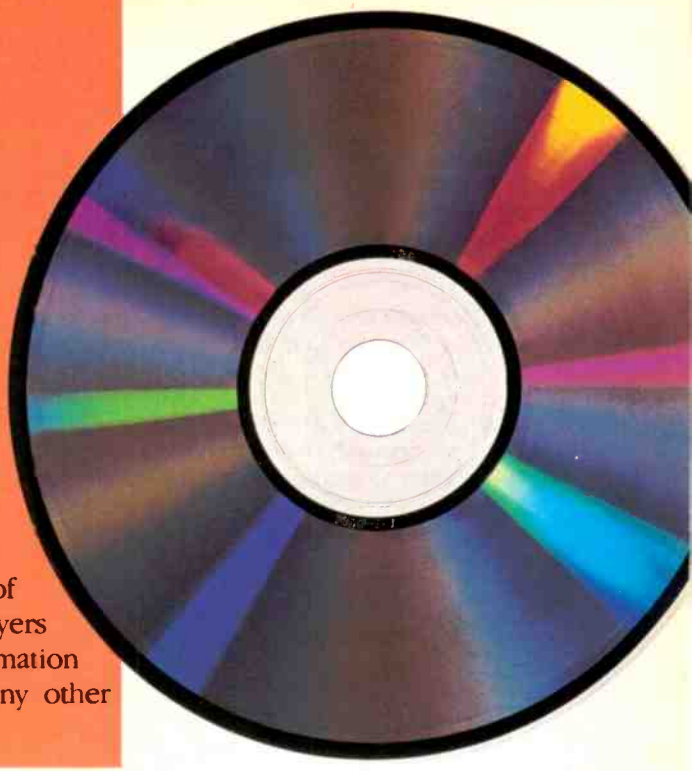
The Compact Disc has become an international standard. That's partially because the audio industry was smart enough, for once, to pile onto a single bandwagon. But the CD's success is due even more to its convenience, durability, and sonic excellence.

CD's Convenience

Convenience starts with the CD's small size. This not only saves storage space, but opens up new uses that LPs couldn't touch, such as portable players to hang over your shoulder or in-dash players for the car. (The size of a car's dashboard radio slot was one

Less than three years ago, there were no consumer CD players. Now there are units for the car, like this Sony, as well as players for home and portable use.

)DUCTION
DISC



A single CD can hold over an hour of music, while CD players offer a level of automation not possible with any other program source.

of the factors considered when the CD's size was set.) The disc is recorded only on one side, so you don't have to flip it over halfway through.

A CD can hold nearly 75 minutes of music, enough for long works such as Beethoven's Ninth Symphony. For longer works, such as operas, the convenience grows: Three CDs can hold as much music as five LPs, and those three CDs require only two interruptions to change discs, while ten LP sides require nine interruptions.

Compact Discs still cost more than LPs, though the price gap between them is shrinking. Works which use the CD's full capacity (such as Beethoven's Ninth) already cost less than the same music would on LP.

The CD system was designed for automation, adding still more to its convenience. All CD players are automatic, to varying degrees—more like cassette decks than phonographs in how they work and look. That automation starts with disc loading and play. You push a button to open the disc compartment, place the disc inside, and close the compartment again. Depending on which button you pushed to close it, the player will either start playing the disc at once or wait for you to tell it which tracks on the disc you want to hear or to skip. Many players even let you *program* those tracks into whatever sequence you please. (It's not like programming a computer; you just key in the numbers of the tracks you want, and the player takes it from there.)

This article is adapted from a chapter of The New Sound of Stereo, *a new book by* Audio's *Technical Editor, Ivan Berger, and Hans Fantel, syndicated audio columnist for* The New York Times. *The book will be published in February 1986 by Plume, a division of New American Library.*

If you want to listen to a track again, just push a button—ditto if you want to jump ahead to the start of the next track or back to the beginning of the previous one. Many Compact Disc players have *audible search*, which lets you zip ahead or back at a high rate while still hearing the music—speeded up (about three to ten times normal) but at correct pitch. This feature helps locate specific passages you want to hear. A growing number of players can also be set to play the first few seconds of each track, or of each programmed track, so you can find the one you want even if you don't recognize its name.

There are *repeat* functions, too. Depending on the player, you can repeat the entire disc, repeat the tracks you've programmed, repeat any single track, or repeat a section of a track that you've marked in the player's memory.

Many cassette recorders also do these things. But tape players take longer to do them because they have to search all along the tape for the selections you want. A CD player just consults a computerized table of contents at the start of the disc once, memorizes it, and then zips across the disc (a basic advantage of the disc shape over tape) to any track you want. Tape's audible cue and review functions are slowed down still further, to minimize the screech you hear when listening to a speeded-up tape—something that's avoided with a speeded-up CD.

Besides, tapes hold only audio information; CDs hold that and a good deal more. For example, since the tracks on classical CDs tend to be fairly long, some have *index* points coded where significant passages start within a track; an opera, for example, might have one track per act, but index marks for every scene or aria. Some players let you go straight to any of these indexed points, just as you can to the beginning of a track, simply by keying in its number and pushing a "go" button. Not all discs are indexed, however.

There's also room on the disc for other codes, as yet unused. Future CDs (and we're only talking a year or three into the future) may use the information space for song titles, sing-along lyrics, opera librettos, song translations, or even a series of still pictures, to be displayed by the player itself or on your TV screen. Some CD players already have output jacks for this purpose. And, as yet another link between CD and the TV screen, there are already players which use one laser to play both CDs and LaserVision videodiscs.

CD players also have *displays* to tell you what they're doing. The more expensive the player, by and large, the more elaborate and informative the display. Lower priced models may tell you only which track is currently playing. Others may tell you how many tracks are on the disc, how long they are, how long the entire disc is, how much playing time has elapsed since the beginning of the disc or the current track, and how much remains—all helpful when taping. The display may

Future CDs may use their extra data space for song titles, lyrics, or even pictures, to be displayed by the player itself or on a television screen.

also indicate what selections you've programmed for play and how many are left.

Some players show on their displays how all their switches are set, so you can read all operating information in one place. Other players put little lights

on each switch, which makes that information easier to read from across the room.

Players also differ in the number of selections you can program them to play automatically, ranging from none to 99. On multi-disc, automatic CD changers, which are still rare, you can program in the disc as well as the track number. With just a minute or so of button-pushing, this allows you to set up a whole evening's listening.

This hardly exhausts the list of CD conveniences. Most of the more expensive players have *remote control*; some even share a single remote-control unit with other audio or video components from the same manufacturer.

A few players have *pitch controls*, which raise or lower the recording's pitch to match yours, if you want to play or sing along with the disc. Unlike the pitch controls on some turntables and tape decks, the ones on CD players don't change the tempo when they change the pitch.

Like most tape decks, some CD players have *timer start* switches, which start play as soon as power is fed to the unit. With this and an external timer, you can program a player as a musical alarm clock—an expensive substitute for a clock radio, but at least you'll know exactly what music you'll hear when it switches on.

If you tape CDs for use in a car or portable cassette player, you may find them among the best-sounding tapes you own. Several player features are designed to make such taping easier. Some have *calibration-tone generators*, which put out a tone at the same level as the strongest signal that could come from a CD. This will help you set your tape deck's level controls before recording. A few also insert several seconds of silence between tracks so that a tape deck's music-search function will be able to sense the silent gap between musical selections and, hence, to find the start of each selection.

The *auto-pause* function found on some CD players serves several purposes. When you're taping individual selections from different CDs, it saves you from accidentally taping the track that comes after the one you want. (Players which automatically stop after playing a single, programmed track are of equal help when taping.) The enforced pause also gives you a chance to decide what to listen to next if you don't want to program several cuts at once. If the music is deeply arresting, it also lets you stop and contemplate what you've just heard, instead of dashing merrily on to the next selection.

At least one player now has a built-in *compressor*, which can be used to narrow the dynamic range between the loudest and softest signals on a CD. This lets you record a CD with a wide dynamic range onto tape, whose range is narrower. It also keeps the sound from becoming too dramatic for quiet listening. This is especially useful when making tapes for use in the car, where road noise often drowns out quiet passages. Future CD players may also have *expander circuits*, to make the swings between loud and soft more dramatic if you feel a performance is too tame.

If recordings took full advantage of the CD's capability to reproduce the full dynamic range of a live performance, there'd be no need for an expander. But few CDs do use the entire range available, partly so they'll stay listenable under home (as opposed to concert-hall) conditions, but also because they're often made from the same basic master tapes as LPs are, to simplify life for the record companies. As CDs account for more of their business, record companies are beginning to produce separate, wider range master tapes for the digital medium. At that point we'll need compressors, for times when our homes are noisy or we're not listening with full attention.

We've described these features in general terms because different manufacturers give them different names. The more features a CD player has, the more convenient it becomes to use—up to the point where the number of buttons and display indicators overwhelms you. Even then, careful design can make the player's controls easier to understand.

Your tastes and circumstances govern which features you'll want. For example, programmability means more to pop-music listeners, whose discs contain many short songs of unequal quality; classical-music listeners tend to listen to a disc from beginning to end. Remote control is helpful if your system's components are far from your listening chair, but not much use if you can reach the front-panel controls from where you sit. Players which load from the front can be stacked under other components, while top-loading players may be more convenient if they're placed on a low cabinet or table.

CD Durability

A CD is a lot less vulnerable to damage than an LP. It's made of harder plastic, and the recorded information is not on the disc's surface, but inside, where the transparent plastic shields it from harm.

As CD sales increase, record companies are starting to make separate, wider range master tapes for the digital medium.

That's possible because nothing touches the actual recording. The laser merely looks at it. The beam focuses on the recorded inner layer, and an optical system reads the light reflection, which represents the binary code. The plastic of the disc material is actually part of the optical system, narrowing the laser spot as it passes from the disc's surface down to the recorded layer. As a result, all but the worst dirt and scratches are far enough out of focus to be invisible to the player's optical system. And since the disc's surface is glassy smooth, not grooved like an LP's, most dirt is easily wiped off with a clean, damp, soft cloth.

CDs aren't invulnerable, however. Although dirt wipes off the playing surface, scratches don't. Minor scratches usually won't affect play, but bad ones can cause distortion, add noise (usually a ticking sound) or make the laser skip or lose its place. Dents and scratches on the label side can be even more serious, because the information layer within the disc is protected only by a thin and fragile lacquer coating on the label side, as compared to the thick, tough plastic below the information layer. CD players can compensate for many problems caused by dirt or damage, but not all of them. It pays to pamper Compact Discs. They're becoming less expensive, but they're still not cheap.

Do CD Players Sound Alike?

There *are* differences between the sound of different CD players. But those differences are very subtle—so much so, in fact, that even experts have trouble hearing them. What differences there are stem mainly from the players' *filtering* method, their *error-correction* circuitry, and their *analog output* sections.

When a digital signal is turned from a hail of numbers to a stream of sound, ultrasonic frequencies creep in; they are not audible but can cause audible problems. These frequencies must be filtered out. Filtering them from the analog output signal takes complex filters (sometimes called *brick-wall* filters, because of their sharp attenuation of the undesired frequencies), which affect the phase response of the sound. If some of those frequencies are filtered from the digital signal first, very mild analog filters can then finish the job. Many expert listeners feel that this technique, of using digital filters together with analog filters, improves the sound.

Where analog systems try vainly to eliminate errors such as noise and distortion, and then hope for the best, digital systems acknowledge that errors will occur and take steps to limit their effect. Minor errors can be completely corrected, and those that are too large to be corrected can be "concealed," with the player computing and filling in approximately what the correct signal should be. The better the player, the less it errs in reading data from the disc, the more errors it can correct, and the fewer it has to conceal. Unfortunately, there are no specifications for this, so error-handling ability must be inferred from test reports which tell how well the player can handle special "obstacle course" test discs, and from whatever differences you can hear when comparing players to each other.

After the digital data has been read, error-corrected and converted into analog form, the signal must go through ordinary analog circuits in the player's output section. Some player manufacturers lavish attention on these circuits, while others throw in just enough cheap parts to do the job. This, too, can subtly affect sound quality.

CD Tomorrow—and Beyond

In a few years, you may even be able to record CDs at home, as easily as you now record tapes. The first recordable CDs may be "write once" discs that cannot be erased and reused, but discs that can be recorded, erased and reused should follow.

Recordable discs will probably encourage the use of the CD as a storage medium for computer data and programs. That could begin before the medium becomes recordable; a standard computer format, CD-ROM, already exists. Yet a CD-ROM holds so much that there are few programs or data bases (other than an encyclopedia or two) that can fill it without waste.

But you can already record digital sound at home—though on tape, not disc. Even before CD arrived, there were PCM processors, which used videocassette recorders to record studio-quality digital sound, and a few complete PCM recorders using videocassette tapes. Coming soon will be digital recorders using small tape cassettes, about two-thirds the size of today's regular cassette tapes.

LIVING WITH CDs

LEONARD FELDMAN

(Originally published January 1985)

Some of us have owned Compact Disc players for nearly two years now. Others have only recently taken the plunge, while many more readers of *Audio* are, no doubt, still holding out for a variety of reasons. My own reactions (almost entirely positive) to laser-optical digital audio discs were formed early on in the brief period that players and discs have been on the market. Those opinions haven't changed much since I purchased the first CD player I could get my hands on (the one I still own, incidentally). But it has occurred to me that my opinions might be colored by my access to some of the best CDs around, as well as by my opportunity to obtain some discs for nothing or next-to-nothing, as a reviewer and tester of equipment and as a member of the audio press. I wondered what the serious audio enthusiast was thinking about CDs and CD players—now that both have been available to us for some while.

Lacking the financial resources to conduct an official, meaningful poll, I saw no easy way to get a sample of opinion from audiophiles across the country. Then, a fortunate thing happened. I was asked to deliver a talk in some 22 cities around the U.S. as part of a seminar about digital audio and other advances in audio and audio-related video technology. After working out an itinerary that called for visits to three or four cities per trip over a period of three months, I agreed. And as a result I was able to communicate on a one-to-one basis with hundreds upon hundreds of interested audio enthusiasts, many of them with questions about CDs they had been unable to get answered satisfactorily. Many, too, had been fed misinformation by a variety of sources, ranging from uninformed sales personnel intent on selling the new CD technology even if they had to stretch the truth a bit, to quotes from advertisements created by over-enthusiastic ad agencies who obviously hadn't checked back with their clients' technical people.

Because I came away from this period with a clear impression of what people want to know about CDs, I thought it might be a good idea to share some of the questions raised during this extended tour around the U.S. Some of the answers I gave are simply factual, while others, clearly, are my own opinion, formed after two years of familiarity with a variety of CD players and a good sampling of CDs. My purpose here is to help others make up their minds about the Compact Disc system—whether to purchase a player now, later, or even perhaps never. I'll present the material as a question-and-answer session—much as I did during the actual seminars.

Q. When will the price of Compact Discs come down—and by how much?
A. Don't expect CDs to ever cost as little as mass-produced LPs. At present, manufacturing costs run about five times those of an LP. Remember, though, that CDs can contain more than an hour of music, as opposed to 30 to 45 minutes on an LP. Furthermore, high-quality audiophile LPs sell for prices comparable with CDs and always have—and, of course, CDs sound a lot better and last a lot longer than even the finest audiophile LPs.
Q. I've heard that CDs are indestructible. Is it true that you can scratch them or allow dust to land on them and that the laser will still read through these defects?
A. The ability of the laser pickup in a CD player to read around minor defects in a disc is truly remarkable, a result of the laser beam's focusing *beneath* the transparent surface of the disc. Sophisticated error-correction circuitry—an inherent part of the CD standard—also help. Because of this circuitry, the laser beam, in effect, has more than one chance to read the digital information if a dropout is encountered owing to an opaque scratch or dirt spot on the disc.

It should be emphasized, however, that these factors only work *up to a point*. If scratches are severe, or if dirt and dust are allowed to accumulate on the disc surface, any CD player will mistrack. The result will either be a momentary muting of the music or skipping parts of the music, or even repeating the same phrase of music over and over again. *The same care should therefore be taken in handling CDs as you would take in handling your best LPs.*
Q. When will the price of CD players come down to $200 or even $100?

A. Prices for CD players have already fallen dramatically, as manufacturers introduce more economically fabricated second- and third-generation machines and as LSI chips are designed to take the place of more and more discrete circuitry. But you must be careful when you shop. Ultra-low prices for CD players may also result from skimping in such important qualities as error-correction capabilities and laser-tracking stability, not to mention omission of convenience features found in the more expensive players.

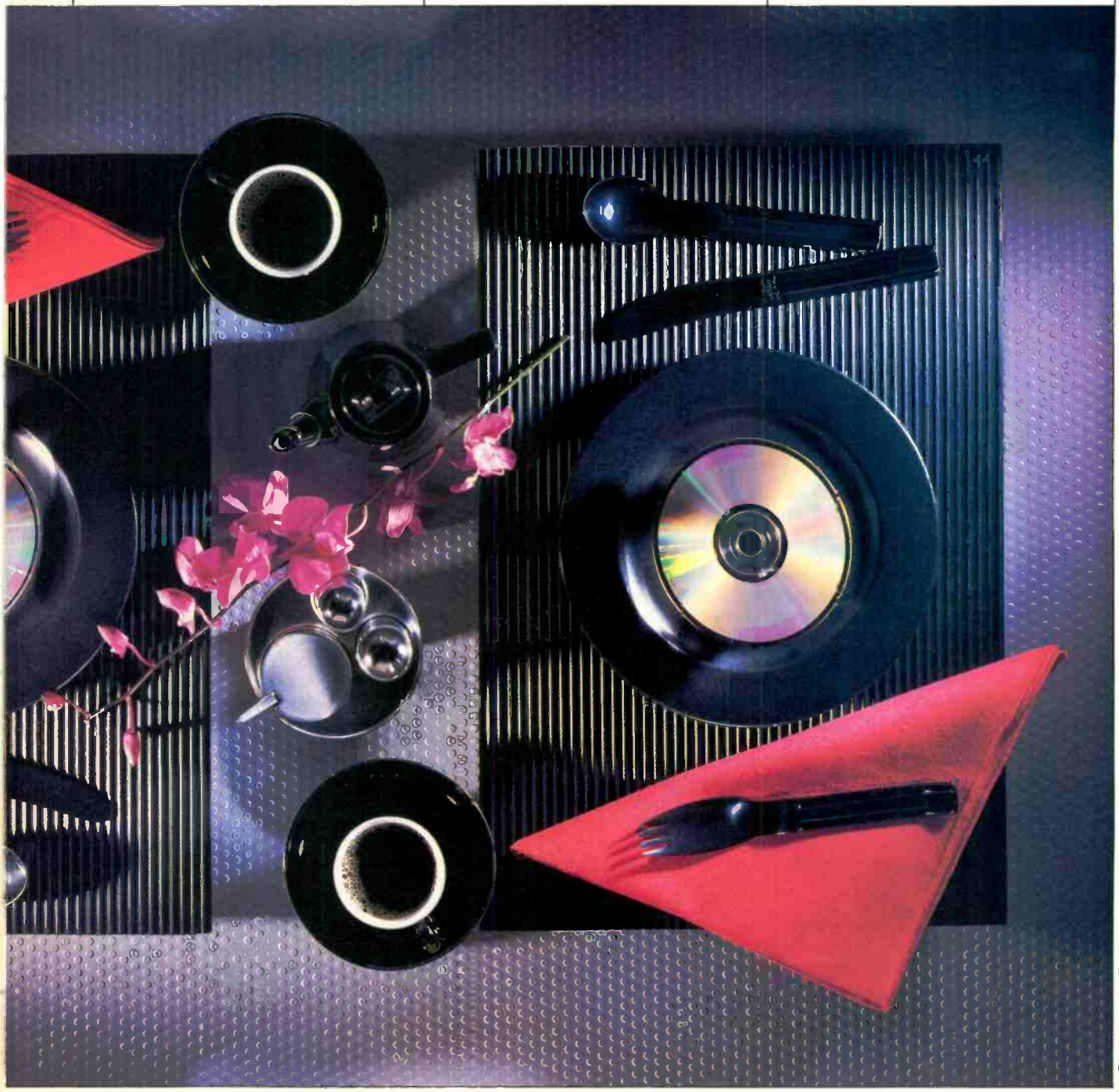
Q. So, what *are* the major differences between CD players? Does one model sound different from another?

A. There seem to be some subtle sonic differences between different players, but these are relatively minor. Major differences involve programmability, the time it takes to access a given track, tracking stability, and ability to overlook minor defects in the disc through elaborate use of an individual unit's error-correction circuitry and techniques built into the CD standard. Resistance to mistracking caused by external shock or vibration is another factor that varies from one player to another.

Q. Some CDs have come out that were made using *analog* master tapes. Isn't that something of a rip-off? Shouldn't CDs be digital all the way from master tape to finished product?

A. *Many* fine-sounding CDs are being made from analog masters, and, frankly, there's nothing wrong with this practice if the original performance was worth preserving and the master tape technically well recorded. A good analog master tape can have more dynamic range than can be contained in an LP, so CDs made from such tapes do sound better and have more dynamic range than the LPs made from the same masters.

Q. Will we ever be able to record onto CDs, as well as using them just for playback?



Photograph: Robert Lewis; table settings courtesy of D.F. Sanders & Co., New York City

Two-sided, two-hour CDs are possible but not probable. Just the royalty rates on so much music would make the cost prohibitively high.

A. I'm always puzzled by this question. Why should we expect to be able to record CDs at home when no one ever asks about being able to record LPs at home? At present, PCM processors enable anyone to make digital audio recordings using a videocassette recorder. Many large firms, including 3M, Sony, Philips, Sansui and Sanyo, are investigating this, however.

Q. With all that extra dynamic range in CDs, how much extra power will I need in my amplifier to take full advantage of CDs?

A. There's no one answer for this question. It depends upon how much amplifier power you now have, how efficient your speakers are, and at what loudness levels you like to listen to music. In general, though, somewhat higher amplifier power or a trade-up to more efficient loudspeakers, or both, is usually in order.

Speaking of dynamic range, it's worth noting that when CDs are played in cars, their dynamic range will be too great for on-the-road enjoyment. Ambient noise in automobiles is so high (often as high as 70 dB SPL, even with the windows closed) that, in order to hear the softest passages of music, the volume will have to be turned up so high that the loudest passages will either overload the typical car stereo system or be deafeningly loud. Many manufacturers of car CD players are expected to offer—either built into the CD unit or as an optional add-on—electronic compressors to reduce these dynamics to a manageable range. Philips has already showed such a player in Europe. Of course, the CDs will continue to deliver their full dynamic range when played at home or with the players' compressor circuits turned off.

Q. I've heard rumors that we're going to see combination disc players that will play both laser videodiscs and CDs. When will such players be available?

A. The rumors have finally borne fruit—the first quarter of 1985 should see such players brought to market by Pioneer (and by Sony and Technics, selling units actually made by Pioneer). Pioneer's dual-purpose machine, however, is not only more expensive than a CD player alone, it's a good deal more expensive than a CD player and a LaserDisc player together, though the combination unit takes up less space than the two single units it replaces.

Q. Isn't it possible to produce CDs with music on both sides? If so, why aren't record companies making two-sided CDs?

A. Yes, it is possible and provisions for such discs were made when the standards were set. Still, you're not likely to see two-hour, two-sided discs in the foreseeable future, for two reasons. First, although the yield of discs now exceeds 80% (eight out of 10 CDs that come off the molding machines pass quality-control tests), sandwiching two discs together, back to back, would automatically double the quality-control problems, dropping the yield rate to around 60%. Second, a double-sided disc would have no space for a label, and it might not be compatible with existing players and pressing equipment. Then, too, in the case of popular-music recordings, the extra royalties for the additional selection needed to fill two sides of a CD would raise the cost of such discs prohibitively, thus reducing sales.

Q. Why isn't there at least the hour of playing time that can be put on a single-sided CD? Most CDs seem to have no more music on them than regular albums.

A. Consumers have a valid complaint here. Unfortunately, most record makers simply transfer the programs used for making LPs (whether from digital or analog master tapes) onto CDs. A few (especially in the classical field) have seen fit to append a short selection after the main musical program, such as an overture to a disc containing a symphony or two by the same composer. In the popular-music field, record companies would run into the same problem of additional royalties for added songs that they would if they made double-sided discs. But if you want more music on your CDs, you should make your voice heard at the record companies, by requesting that those companies fill out their CDs to full length more often.

Q. There is a vast amount of unused storage space in CDs. What can this extra data storage space be used for, and when are we likely to see CDs that include such additional data?

A. There are several areas of unused storage space in CDs as they're currently made. So called "subcodes" bearing the identifying code letters R through W are available for a variety of data storage. Among the kinds of data being considered are digitally generated graphics, not unlike those available on home computers and teletext. A CD has enough data storage space left, after including stereo audio and track/time display information, to generate approximately 250 still-pictures during the course of an hour's worth of recorded music. Such pictures, displayed on a TV screen with an add-on "black box" connected to the CD player, might show the lyrics of a song, the libretto of an opera, or scenes appropriate to the music—in fact, almost anything you can imagine.

Q. Some CD players apparently use a higher digital sampling rate—does this result in better sound? What's the story on this?

A. Another source of confusion. There's only one sampling rate for the CD system: 44.1 kHz. For that matter, there's only one "bit" count for CDs too: It's a 16-bit standard. Talk of 88- or 176-kHz sampling rates has to do with the way in which various CD players decode or read the information contained in the disc. Some, for example, read the same sample two or four times, in a technique called oversampling. Others use a 14-bit D/A (digital-to-analog) converter but end up achieving the full dynamic range and other characteristics inherent in the 16-bit system. Each approach claims sonic superiority, and you are invited to judge that for yourself. But the basic world standard set for CDs employs one, uniform sampling rate and a 16-bit sampling system.

While these dozen questions may not answer everything you want to know about Compact Discs and CD players, the important thing to remember is that CD technology is scarcely two years old. By contrast, we've been dealing with analog audio recording in one form or another for more than 108 years. It will take a little more time till we have all the answers for a technology this new. I, for one, am willing to wait while I enjoy the better sounds I'm getting—even with my first-generation CD player.

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GRP Digital 154203

Pavarotti: Mamma • Title song, Vieni sul mar, more. Henry Mancini conducts.
London 115310

America, The Dream Goes On • Boston Pops/Williams. Title song, America The Beautiful, more.
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DG 115268

Dvořák, Symphony No. 9 (From The New World) • Chicago Symphony Orch./Solti.
London 115168

Eurythmics: Be Yourself Tonight • Would I Lie To You? There Must Be An Angel, Adnan, Conditioned Soul, more.
RCA 153394

Rachmaninov, Symphonic Dances; Vocalise; more • Berlin Philharmonic/Maazel.
DG 115113

Pointer Sisters: Contact Dare Me, Bodies And Souls, Hey You, Pound Pound Pound, Contact, Bum Down The Night, etc.
RCA 124611

Barry Manilow: 2:00 AM—Paradise Cafe • When October Goes, Big City Blues, etc.
Arista 161489

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DG 115408

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BATTLE OF TH

SONY D-5 PORTABLE COMPACT DISC PLAYER

Company Address: One Sony Dr., Park Ridge, N.J. 07656.

(Originally published March 1985)

When I first encountered this smallest of all CD players, I had to force my way through a crowd of enthusiastic audiophiles who were attending the 1984 Japan Audio Fair. Meanwhile, back in the United States, Sony had elected to introduce this amazing little product at the same time as it was being introduced in Japan. That in itself tells you how important Sony felt this product was going to be.

There are several significant breakthroughs involved in the design of the D-5. First and foremost, it is a very low-cost unit, carrying a suggested retail price of less than $300. Second, this CD player can be plugged into a high-fidelity system or used on the move with an optional battery pack/carrying case (costing $49.95) and optional stereo headphones of your own choosing. Finally, the D-5 is actually smaller in width and depth than the plastic case in which CDs are normally packaged; it measures only 5 inches by 5¼ inches. The height of the player is a mere 1½ inches, and it weighs slightly more than 1¼ pounds.

Despite its low cost and small size, the D-5 performs very much like its heavier and costlier counterparts, though it lacks the programming and random-access features which have constituted the major differences between one CD player and another. Nonetheless, the most important display and access features have been retained, and, of course, the superb performance inherent in the CD format has not been sacrificed in any way. The D-5 incorporates a digital liquid-crystal display which lets you know what track is being played, how much time has elapsed on a given track, and, at the press of a button, the amount of time remaining on the entire disc and the number of tracks remaining. In addition, there is a battery condition indicator and two other LCD indications: One for "AMS" (Automatic Music Sensor) and the other for music "Search" or audible fast-scanning of a disc's contents.

After pressing the "Open" button on the D-5's top surface (in the corner), a disc may be loaded directly onto the turntable. A special safety switch automatically disengages the D-5's mechanism whenever the loading door is open. All other controls and the display are found on the player's front. These include a time remaining button for the display, a "Mode" button (which toggles between the "AMS" and "Search" functions), a toggling play/pause button, a power switch, a stop button, a continuously variable headphone volume control, and a mini stereo-headphone jack. A line-output jack (also a stereo mini type) and a d.c. input terminal are on the rear of the D-5. An a.c. power adaptor which delivers 9 V in the correct polarity is supplied, but the battery contained in the optional case, or an optionally available car-battery cord, could also be connected at the d.c. input terminal.

When the battery case is used, it must be loaded with six C-size alkaline batteries whose life is approximately 5 hours at normal listening levels. Rechargeable nickel-cadmium batteries may also be used with the optional battery case. Charging time for these would be around 15 hours, with fully charged nickel-cadmium batteries supplying around 2½ hours of play.

Much of the engineering that made Sony's car CD players possible has also been applied to the D-5. For example, a single-chip, high-density VLSI has been used for primary digital functions and for simplified and stabilized player functions. In addition, the miniaturized laser-optical assembly found in the Sony car CD players has also been used.

Basic performance of the D-5, as might be expected, is very much like that of Sony's car CD units (one of which, the CDX-R7, I measured and reported on for the July 1984 issue). Sony has, so far, continued to use steep, analog, output filters which cut off above 20 kHz, but response up to

Continued on page 16

E PORTABLES

TECHNICS SL-XP7 PORTABLE COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 4 Hz to 20 kHz, +0.5, −1.0 dB.
THD: 0.006%.
Dynamic Range: 90 dB.
Number of Programmable Selections: 15.
Channel Separation: 90 dB.
Line Output Level: 2.0 V.
Headphone Output Level: 15 mW into 32 ohms.
Power Supply: D.c. ±6 to ±7.2 V, via supplied adaptor.
Power Consumption: A.c. adaptor, 8 watts; optional carrying case, 3.2 watts.
Dimensions: 4-31/32 in. W × 1¼ in. H × 4-31/32 in. D (12.6 cm × 3.19 cm × 12.6 cm).
Weight: 1.1 lbs. (0.52 kg).
Price: $299.95; optional carrying case with nickel-cadmium battery pack, Model SH-CDB7, $49.95.
Company Address: One Panasonic Way, Secaucus, N.J. 07094.
(First published this issue)

While neither company would readily admit it, it's no secret that Matsushita Electric (the parent company of Technics) and Sony are forever trying to outdo each other when it comes to innovations in consumer-product technology. To Sony goes the credit for coming up with the world's first portable CD player. That unit, the D-5, has been around for about a year now, and it has been very well received. Technics, however, takes Best-of-Class honors for a portable CD player with the most features in the smallest physical package. Consider its size: Scarcely wider and longer than the diameter of a Compact Disc. That's a tad smaller than the Sony D-5, but the disparity in size is readily apparent when you insert the Technics SL-XP7 into its optional combination carrying case/battery pack. In this configuration, the Technics portable occupies about 40% less space than the Sony unit similarly installed in its optional battery pack/carrying case.

The single most important feature found on the Technics unit not available on the Sony, is random-access programming. Up to 15 selections on a disc can be programmed to be played in any order. In addition, it has the kind of convenience features found on most home CD players, such as forward and backward skipping of tracks, forward and backward audible fast search, and repeat play. There are two miniature output jacks; one is for line-output connection to a home stereo component system, the other for connection to a pair of headphones. The headphone output level is variable. An interesting additional feature is a high-cut filter which affects only the headphone output. Some listeners find that when listening to CDs through headphones, high-frequency content can be a bit too strong. Under these conditions, turning on the high-cut switch provides a gentle roll-off above about 3 kHz.

An LCD display on the unit's front provides fully as much status information as displays found on larger, home CD players. The display will indicate total number of tracks and total playing time (when a CD is first inserted and scanned), track number being played, elapsed or remaining time, the programmed order of tracks, if the "Repeat" function has been activated, and if battery voltage is low.

The SL-XP7 comes with an a.c. adaptor that also serves as the recharger for the nickel-cadmium battery pack in the optional case. Frankly, I can't think of any reason why you would buy the CD player and *not* buy the carrying case/battery pack. It's this option that makes the little CD player portable. Mounted in its carrying case and with a fully charged battery, the player will operate for three full hours.

The D-5 is not a Walkman; it is not intended to be carried on a belt loop. Jogging will cause mistracking.

Continued from page 14

that frequency is extremely flat. The usual low distortion and high separation figures can be expected from this player. Output via the line-level jack is approximately 1.6 V, not unlike the voltage levels one expects from a larger table-top or shelf-mounted CD player. Use of 32-ohm headphones, such as those recommended by the manufacturer, results in a maximum power output from the phone jack of around 10 mW per channel—enough to drive some of those new high-efficiency stereo headphones.

In my hands-on tests, I found that the D-5's controls operated reliably and positively and that sound quality was as good as that obtained from any of the larger Sony CD players.

The D-5's optional carrying case

Because of Sony's efforts at creating small, portable music sources such as the famous Walkman, it was inevitable that the D-5 would be greeted in many circles as the "Walkman CD." In fact, Sony emphasizes that this product is *not* in the Walkman category: It is *not* intended as a product to be carried on a belt loop by morning joggers. The elaborate stabilizing techniques used in Sony's car CD players have not been incorporated in the D-5 (nor does Sony claim they have been); therefore, if you bounce the unit around too much when a disc is being played, it *will* mistrack. What Sony did intend for the D-5 was that it be used on a fairly stable surface—at home, walking (not jogging), in the park, on the beach, or wherever else you happen to be when you crave noise-free music reproduction of wide dynamic range. That being the case, Sony seems to have succeeded admirably with its D-5 CD player. *Leonard Feldman*

Continued from page 15

Recharging takes seven hours if you don't use the SL-XP7 while charging, or 11 hours if you're recharging and listening to CDs at the same time. However, unlike Sony's D-5, which can be powered using readily available, replaceable C-cells, the SL-XP7 is restricted to the nickel-cadmium batteries built into its carrying case. So, for instance, on a coast-to-coast plane trip you would need *two* fully charged carrying cases to listen to CDs!

Control Layout

Press the pushbutton on the top-left corner, and the top cover pops open, exposing the turntable onto which the Compact Disc is placed. If the unit's power switch is on, closing the cover sets the turntable spinning. The laser pickup scans the contents of the disc, and the number of tracks and playing time are indicated on the front panel's display. Pressing the play/pause button located on the right corner of the top surface begins play from the start of the CD.

Near the display area on the front panel are a "Memory/Recall" button (used for storing programmed tracks and reviewing selected program sequences), a "Remain Time" button (which switches the display during play from track time elapsed to time remaining), and a "Repeat" button. The repeat function will cause either a single track, all programmed tracks, or the entire disc to be played repeatedly, depending upon what mode of play has been selected. Three larger pushbuttons, located near the right edge of the front panel, are used for controlling the SL-XP7's forward/skip functions and to stop play or clear a previously memorized program.

The power slide switch is located along the left side panel of the tiny CD player, while the line-out stereo minijack and the d.c. input terminal are on the rear panel. The right side panel houses the headphone output jack, its associated thumb-wheel level control, and the on/off slide switch for the high-cut filter.

The optional carrying case is not much larger than the SL-XP7 itself, which fits neatly into it, the player's d.c. input terminal engaging a mating plug from the carrying case. A cover comes

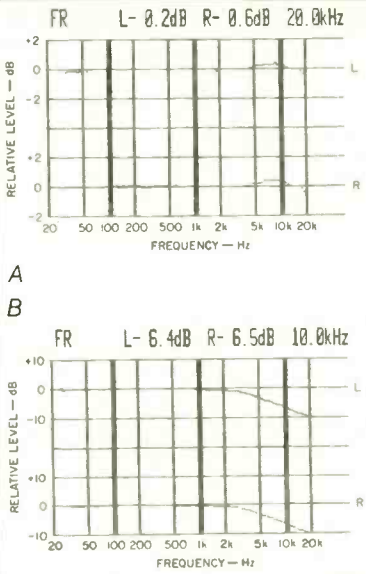


Fig. 1—Frequency response, left (top) and right channels, with high-cut filter off (A) and on (B). Note change of vertical scale, from 2 dB/div. (A) to 10 dB/div. (B).

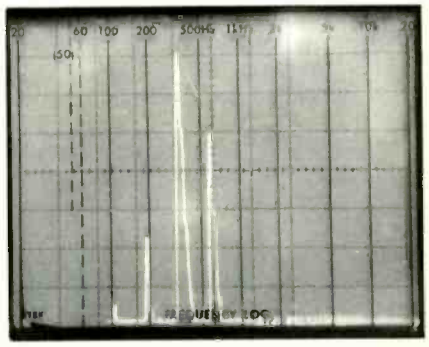


Fig. 2—Spectrum analysis, from 0 Hz to 50 kHz, showing 20-kHz test signal (large spike) and unwanted "beat" outside the audio frequency range.

Stereo separation for the SL-XP7 was one of the few parameters tested that didn't measure up to larger CD players.

down and, together with a rear thumbscrew, firmly locks the CD player inside the rubber-cushioned compartment. For charging the nickel-cadmium battery or for continued a.c. operation, the a.c. adaptor cable, instead of being connected to the d.c. input terminal at the rear of the player, is now plugged into a similar terminal on the rear of the carrying case. A switch on the front of the case can now be set either to "Batt" or "AC/Charge." A shoulder strap is supplied with the carrying case.

Measurements

Let me state at the outset that I was perhaps a bit more critical and careful than usual when conducting bench tests of the Technics SL-XP7. It seemed to me that this little wonder of a CD player could not possibly perform as well as its bigger brothers. But the fact is that it did.

Frequency response was essentially flat from 20 Hz to 20 kHz, with a slight rise near the high end not greater than about 0.3 dB and a roll-off beginning at 20 kHz. As you can see in Fig. 1A, response was down 0.2 dB in the left channel and 0.6 dB in the right channel at 20 kHz. The vertical scale in Fig. 1A is only 2 dB per division, but it is a full 10 dB per division in Fig. 1B, which plots the response of the player with its high-cut filter turned on. Frequencies above 2 or 3 kHz are attenuated at what looks like a rate of 3 to 4 dB per octave, resulting in a −10 dB roll-off at 20 kHz.

As is true of so many CD players, harmonic distortion readings above 10 kHz are deceptive (in fact, rather meaningless). The machines create "beats" between the desired high-frequency signal found on the test disc and the sampling frequency (in this case, 44.1 kHz). This effect is clearly illustrated in the spectrum analysis of Fig. 2, in which the analyzer was linearly swept from 0 Hz to 50 kHz. The tall spike near the center is the desired 20-kHz signal, while the shorter one to its right is an unwanted beat outside the audio frequency range. By introducing a band-pass filter (with a cutoff of 20 kHz), I isolated real harmonic distortion from the nonharmonically related components. Under these conditions, THD at 1 kHz was an unusually low 0.002% at mid-frequencies for recorded output of 0 dB. The three curves in Fig. 3 depict harmonic distortion at 0 dB (maximum) recorded level and at −24 and −30 dB levels. Linearity was nearly perfect from 0 dB output level down to −80 dB output level, with deviation from perfect linearity never exceeding 0.3 dB over that range.

Unweighted signal-to-noise ratio measured 88.7 dB, and the A-weighted measurement was 91.7 dB (see Figs. 4A and 4B). SMPTE-IM distortion measured 0.01% at maximum recorded level, increasing to 0.035% at −20 dB recorded level. CCIF-IM distortion (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was a low 0.0367% at maximum recorded level and 0.0088% at −10 dB recorded level.

Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 60.2 dB at the high-frequency extreme to 88.4 dB at mid- and low frequencies. The SL-XP7's separation was one of the few parameters that did not measure up to larger CD players. This may well be because of the necessarily close proximity between analog or post-D/A components of the left- and right-channel circuitry; I doubt if it has anything to do with the player's digital circuitry. In any event, even 60 dB of separation between channels is about 35 to 40 dB better than what you can expect from most phonograph cartridges at mid-frequencies, and about 45 to 50 dB greater than the separation provided by phono pickups at high frequencies.

Reproduction of a 1-kHz square wave is shown in Fig. 6. The reproduced wave shape is typical of that produced by CD players which employ steep, multi-pole analog filters. Reproduction of the unit pulse in Fig. 7 further confirms the use of a multi-pole or "brick-wall" filter in this unit's post-D/A output circuitry.

As is true of most CD players that employ analog filters, the SL-XP7 exhibited substantial phase shift or phase error when reproducing high-frequency signals. An attempt to illustrate this effect is shown in Fig. 8; the time relationship between 2- and 20-kHz signals is depicted in this dual-trace oscilloscope photo. Had the two signals been in correct time relation-

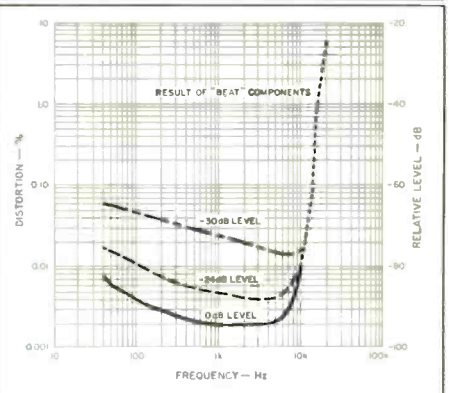


Fig. 3—Harmonic distortion vs. frequency, at three signal levels.

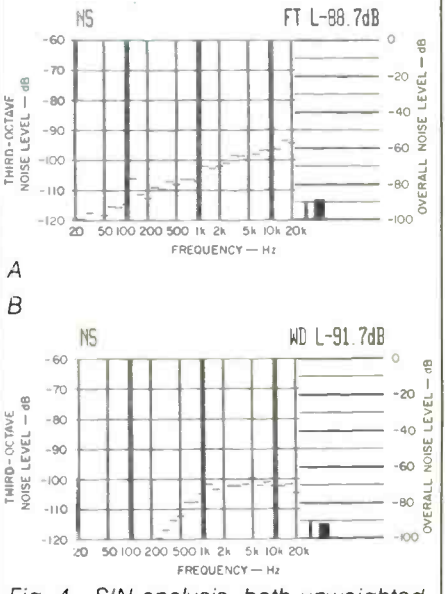


Fig. 4—S/N analysis, both unweighted (A) and A-weighted (B).

All the many convenience features worked perfectly, and sound quality was excellent. The SL-XP7 is a clear winner in the portable CD category.

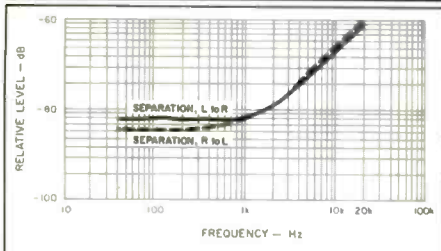


Fig. 5—Separation vs. frequency.

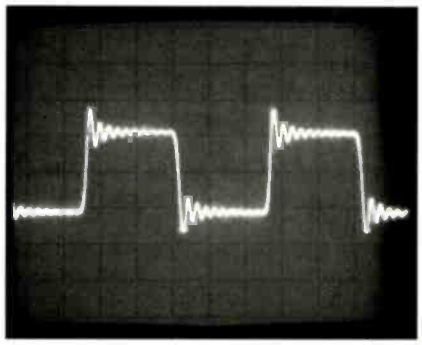


Fig. 6—Reproduction of a 1-kHz square wave.

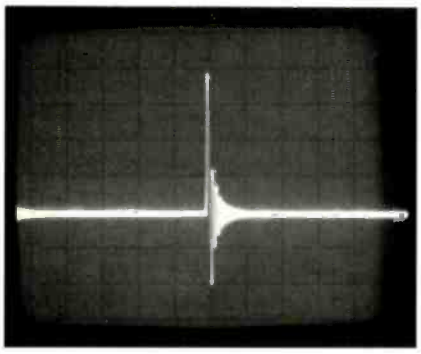


Fig. 7—Single-pulse test.

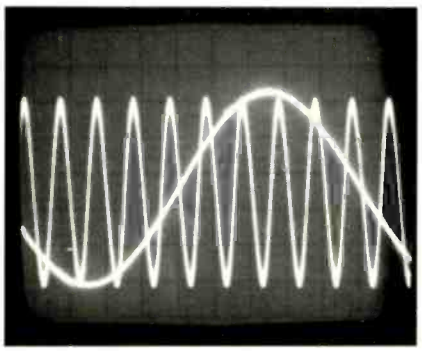


Fig. 8—Phase-error check, using tones of 2 and 20 kHz.

ship, both would have crossed the zero axis in a positive-going direction at the same instant. As Fig. 8 illustrates, that is not the case here, indicating at least a 180° phase shift of the 20-kHz signal component, if not more.

Since this CD player was designed for portable as well as in-home use, I felt certain its makers would give special emphasis to good tracking as well as good error-correction capability. I was right. Not only was the player able to play through the test disc's simulated scratch, the 800-micron-diameter simulated dust particles, and the simulated fingerprint smudge, but its resistance to vibration and shocks applied to its top surface was incredible, to say the least. I'll have more on this in a bit.

Use and Listening Tests

Like the portable Sony player I tested some months ago, the Technics SL-XP7 is not intended for use by joggers—at least not while they're jogging. I did, however, subject the unit to a very practical test that should give you an idea of just how incredibly stable its tracking system is. Using a preproduction version of an adaptor that enables a portable CD player to be heard through a car-stereo system, I road-tested the SL-XP7 over "speed bumps" in a large parking lot and on local streets. Essentially I duplicated a test that Ivan Berger, Technical Editor of *Audio*, and I devised some months back when we tested the first car CD player.

The adaptor I used for my test was designed for Recoton by Larry Schotz, the Wisconsin inventor who has designed circuits and products for such firms as NAD, Proton, Nakamichi and Crown International. Unlike another adaptor, released by Sparkomatic, which plugs into the outputs of a portable CD player and the antenna input of a car radio, Schotz's device requires no physical wiring or connection to the car stereo. (The Sparkomatic adaptor modulates the CD signals onto a FM frequency, to which you then tune your car FM radio. It's a neat idea, but of course it's limited by the performance, frequency response and dynamic range of FM radio—and of your particular car radio.) Schotz's adaptor delivers the full, flat frequency response of the CD you're playing and, if your car-stereo amplifier can handle it, the full dynamic range of the CD as well.

In any event, since I was fortunate enough to have a handmade prototype of this novel CD adaptor, I plopped it and the Technics SL-XP7 alongside me in the front seat of my car and went for a bumpy drive. Even barreling over the parking lot's speed bumps at something more than the five miles per hour for which they were intended, the Technics CD player—simply resting on my car seat—did not mistrack or skip even once. The same performance held true for more ordinary driving, though my town's streets are anything but smooth.

I suspect that players such as the Technics SL-XP7 will prove to be the ideal solution for those people who want CD's quality sound in their cars but aren't ready to mount a player in or under the dash, for fear of theft or simply because of the high cost of car units. The nice thing about using the SL-XP7 in this manner is that, when I was through with my drive, I simply picked up the player in one hand and the tiny Recoton adaptor in the other and took them inside my house, where they were safely secured for the night.

The various convenience features of the Technics player worked perfectly, at rest and on the move, including the programming feature and all of the handy display functions. Sound quality, which should still be the primary concern for anyone investing in a CD player, was excellent. As much as I am a purist at heart, there were some CDs (to which I listened at home through a good pair of headphones) which benefited greatly when I turned on the high-cut filter. (As with all such signal-modifying features, it's always nice, too, to be able to turn it off when you *don't* think it's required.) Of course, one shouldn't look upon a new model solely from the standpoint of its superiority over what's come before, but as of this moment, the Technics SL-XP7 is a clear winner in the portable CD player category. What, if anything, does it lack? Well, a wireless remote control. However, this entire CD player is not much larger than some of the more elaborate infrared remote-control modules I've seen lately, so why bother!

Leonard Feldman

#C38-7481 Count Basie and his Orchestra; Basie in Europe; recorded live; with Whirly-Bird, Jumpin' at the Woodside.

#C38-7680 Duke Ellington; S.R.O.; Recorded live; includes Take the A Train, I Got it Bad and that Ain't Good.

#C38-7682 Gerry Mulligan; Mulligan; Recorded live with Buddy Clarke, Mel Lewis, Art Farmer, Bob Rosengarden.

Previously unreleased Basie, Ellington, Brubeck... now on CD.

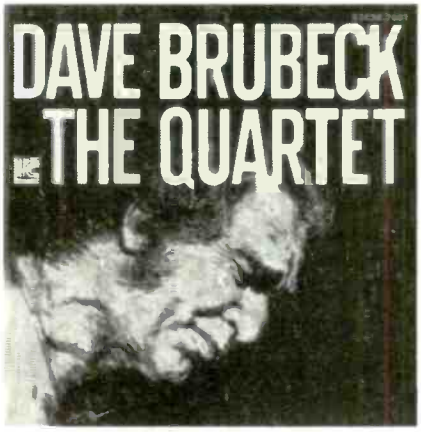
Hear nine legendary jazz performances you've never heard before with sound quality you've never heard before. Released in conjunction with producer Sonny Lester, these new Denon CDs capture up to 65 minutes of live performances by Louis Armstrong, Charles Mingus, Dave Brubeck and jazz aristocrats like Count Basie and Duke Ellington.

This is only the beginning. Look for more new releases that take advantage of Denon digital technology. The jazz greats have never sounded so great.

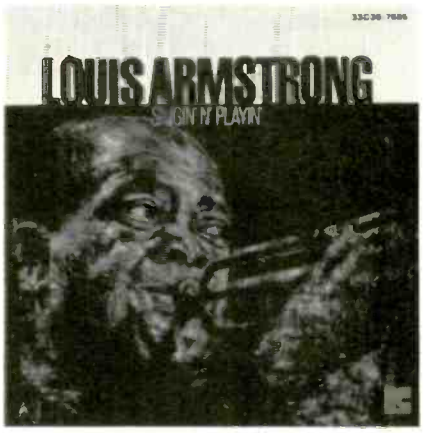
DENON

CDs from the Inventors of Digital Recording.

#C38-7678 Modern Jazz Quartet; Longing for the Continent; Recorded live; features Django, Odds Against Tomorrow.



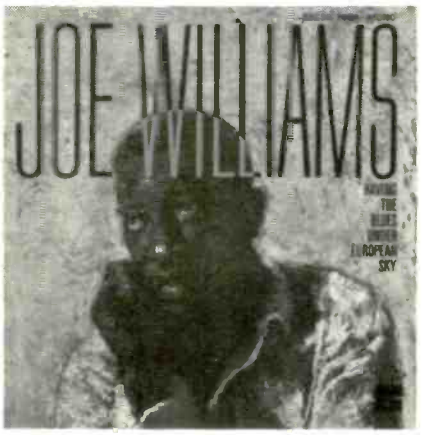
#C38-7681 Dave Brubeck; The Quartet; Recorded live; features Brandenburg Gate, Someday My Prince Will Come.



#C38-7625 Louis Armstrong; Singin' n' Playin'; Recorded live; features Hello Dolly, Mack the Knife, St. James Infirmary.

#C38-7683 Thelonious Monk/Max Roach; European Tour; with Thad Jones, Charlie Rouse, Tommy and Stanley Turrentine.

#C38-7679 Stan Getz with European Friends; featuring Martial Solal, Pierre Michelot, Jean-Marie Ingrand.



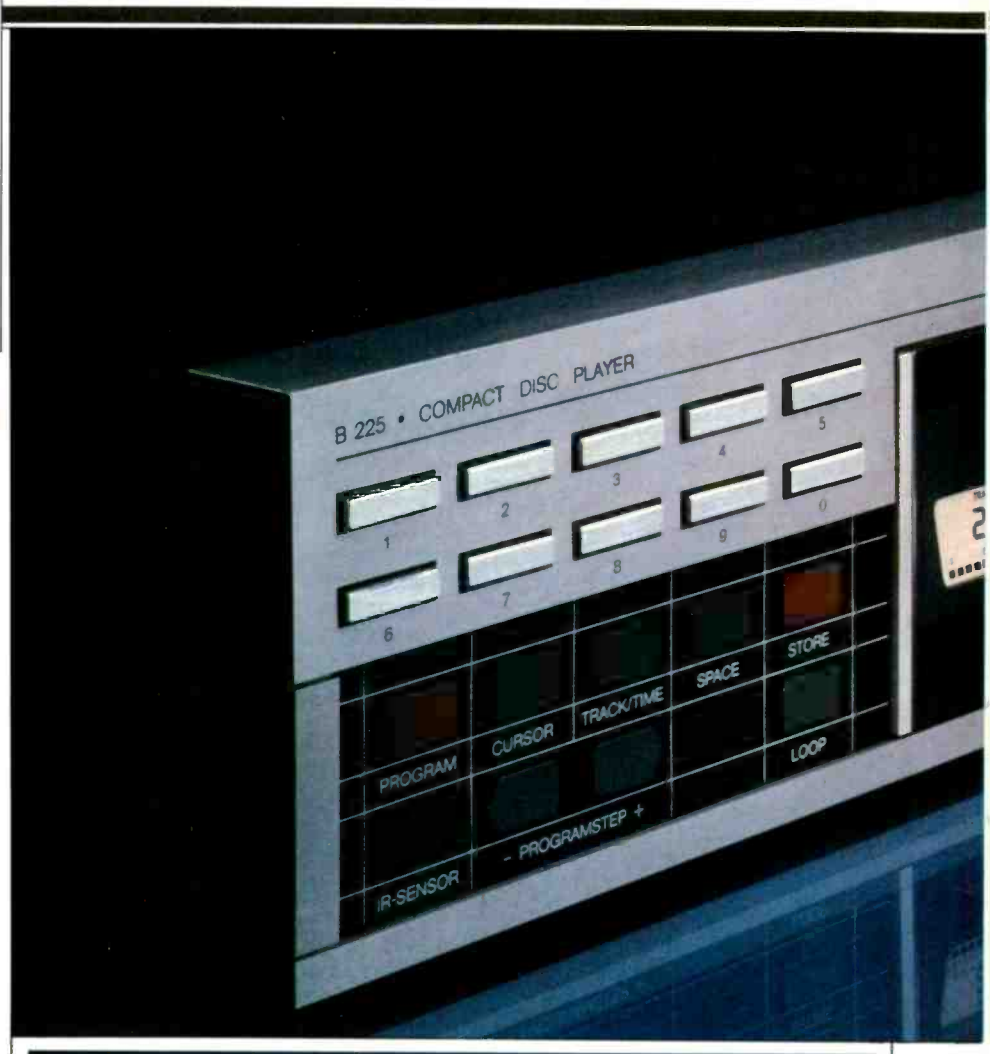
#C38-7684 Joe Williams; Having the Blues under European Sky; with Count Basie & His Orchestra, Ellis Larkins.

Nippon Columbia Co., Ltd., Tokyo, 107 Japan

Denon America, Inc., 27 Law Drive, Fairfield, N.J. 07006
Audio Market Sales, 633 Main St., Milton, Ont. L9T 3J2 Canada

1

REVOX B225 COMPACT DISC PLAYER



Manufacturer's Specifications

Frequency Response: 20 Hz to 20 kHz, ±0.6 dB.

Signal-to-Noise Ratio: Greater than 96 dB, 20 Hz to 20 kHz, unwtd.

Total Harmonic Distortion: Less than 0.006%, 20 Hz to 20 kHz.

Channel Separation: More than 90 dB, 20 Hz to 20 kHz.

Output Level: 2.0 V, fixed; 0 to 2.0 V, variable.

Headphone Level: 13 volts p-p, 35 mW into 600 ohms.

Number of Programmable Selections: 19.

Search Time For Any Location: Less than 4 S.

Wow and Flutter: Below measurable limits.

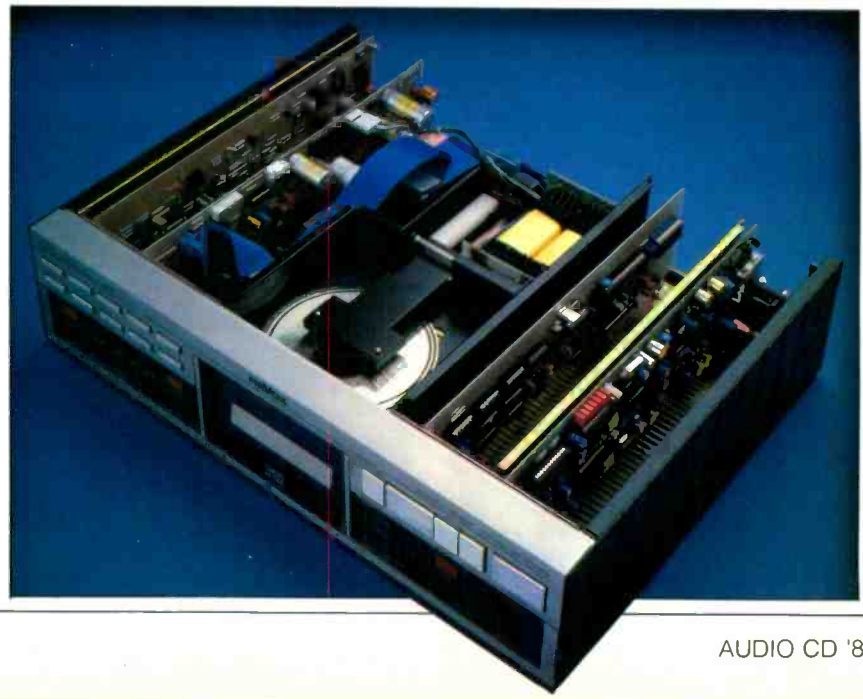
Power Consumption: 40 watts maximum.

Dimensions: 17.75 in. (45.0 cm) W × 4.25 in. (10.9 cm) H × 13.0 in. (33.2 cm) D.

Price: $1,150.00.

Company Address: 1425 Elm Hill Pike, Nashville, Tenn. 37210.

(Originally published September 1984)



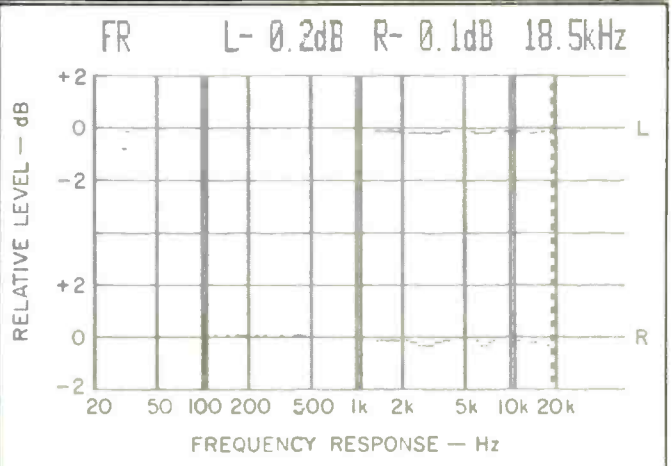


Fig. 1—Frequency response, left (top) and right channels, at 0-dB level.

It comes as no surprise to me that this first Compact Disc player to be built by Studer-Revox is one of the most sophisticated, rugged, yet easy-to-use units of its kind that I have ever tested. After all, Studer and Revox tape equipment is used in broadcast and recording studios throughout the world, and Revox products (the brand name used on Studer's consumer products) are regarded by many to have the same attributes as the company's professional components. What *did* surprise me was the suggested retail price of the unit. I had fully expected the Revox CD player to be among the world's most expensive as well as among the world's best. While it certainly lived up to the latter expectation, its price was no higher than that on some of the first-generation CD players which offered only a fraction of this unit's versatility.

The B225's programming facilities are unusually elaborate, and some are unique. Programs can be up to 19 steps long. Notice I said "steps," not "selections"—each step can include any number of consecutive selections, in their original order. Selections can be programmed by track number or by time from the beginning of the disc—or you can program the start of a selection one way and program its end the other way. Program memory is nonvolatile, so it will retain its contents even if you shut the B225 off or accidentally unplug it.

The three functions which Revox calls "special program steps" are even more unusual. Entering the "Loop" command as a program step makes the program repeat endlessly until stopped. (If pressed in normal play mode, the "Loop" button repeats the entire CD.) The program can pause automatically after any selection, until the pause key is pressed—and can also output the 1-kHz calibration tone to remind you that the program has paused. The player can even be set to turn itself completely off at the program's end! Even handier, perhaps, the program can be "paged" through for checking and then modified without erasing it or starting over.

On the technical side, the B225 follows the Philips system of four-time oversampling (at 176.4 kHz—see April, 1984 *Audio*), with both digital and analog filters, using digital filters specially designed for Revox by Dr. Roger Lagadec.

Control Layout

The first thing I noticed was the panel's logical layout. Often-used controls occupy the right third of the panel, while programming controls are grouped to the left. In the center is the disc drawer, with a multifunction display on its front surface.

The controls at the right include the "Power" switch, and a group of four keys: "Repeat," "Play/Next" (to start play or, if playing, move to the next track or next programmed step), "Stop," and "Load" (to open and close the drawer). Below are five more buttons: "Display" (which switches the display between time elapsed in the current selection and time elapsed since the beginning of the disc), keys to skip back or ahead and to pause or restart play, and an "Autostop"

I had expected Revox's CD player to be among the world's most expensive as well as among the world's best. But its price is not that high.

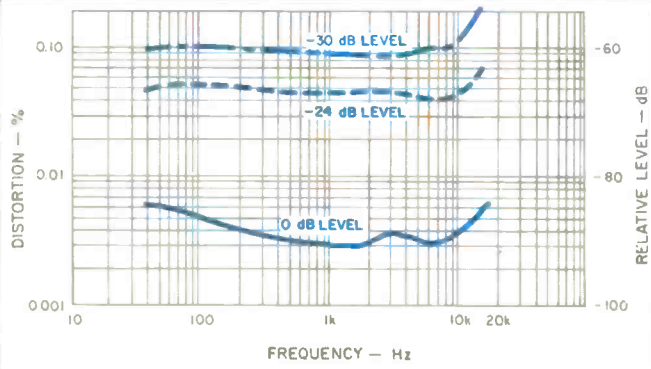


Fig. 2—THD vs. frequency at levels of (from top to bottom) −30, −24 and 0 dB.

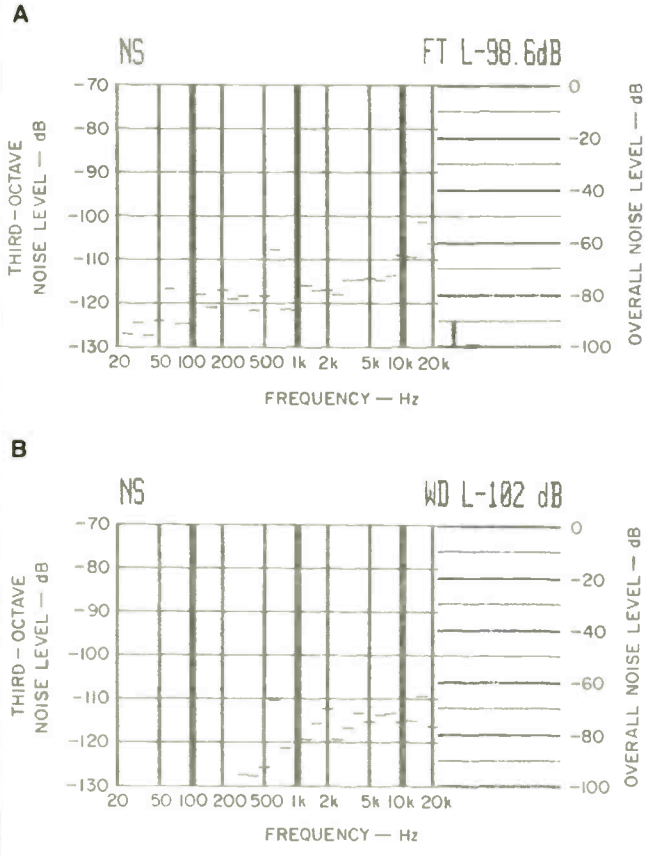


Fig. 3—S/N analysis, both unweighted (A) and A-weighted (B).

key (which makes the player pause at the end of each selection or program step, resuming when the pause key is pressed). At the bottom of this section are the "Cal. Tone" button (which sends a 1-kHz tone to the output jacks, at the maximum level possible from a CD, for adjusting tape-recorder levels) and the up/down "Volume" buttons (which control the adjacent headphone jack and the variable-level outputs on the rear panel).

The B225's display offers a wealth of useful information. In normal (nonprogrammed) play, it shows track and index number, time since the beginning of the current track (or since the start of the disc), and shows whether the "Pause," "Autostop" or "Loop" modes have been activated. If the player finds index signals on the disc, the word "Index" comes on the display, with the current index number just beneath it; there is no way of accessing selections by index number, though.

In programmed play, the display shows the word "Step" to indicate the programmed mode and shows the number of the step being executed. The next field of the display shows the track number or timing that started the selection, with the following field showing the track number or timing (if any) programmed as the selection's end point.

One display function remains the same in both programmed and normal play. When the disc is first loaded, a horizontal line of square bars appears along the bottom of the display, indicating how many selections (up to 30) are on the disc. These bars disappear, one by one, as the tracks they designate are played.

Several of the controls in the programming area at the left can be used for normal play as well. The 10 numbered buttons at the top of this section can be used for direct access to any given track in normal play, as well as for programming track number or selection time (from the beginning of the disc). The "Loop" button at the bottom left repeats the entire CD in normal play, or the entire program during programmed play. The others are for programming only. Pressing "Program" puts the B225 in program-entry mode, which can be done even while a disc is playing in normal mode. The "Store" button enters commands in memory. The "Track/Time" button switches selection start or end-point entry and display between track-number and elapsed-time modes. Start and end points can also be marked while the disc is playing, by pressing the "Mark" button as the desired points come by. Two additional buttons allow you to "page" through a previously entered program, forward or backward, to check or edit it. A "Cursor" key is used to move from field to field of the display when editing a program, or to switch, in elapsed-time programming, from minutes to seconds.

A sensor at the lower left of the panel receives infrared signals from Revox's optional B201 wireless remote-control unit ($125); a light behind the sensor panel blinks to acknowledge commands. The B201 commands the B225's "Play/Next," "Stop," skip-ahead, skip-back, and pause functions, plus direct numerical track entry. The B201 can also be used with Revox's B251 amplifier, B261 tuner, B710 Mk II cassette deck, and the B791 and B795 turntables. To keep the button count down to a reasonable number (38!), the remote does not provide separate buttons for the CD-

The B225's nineteen programming steps can cover more than 19 tracks, and each step can include any number of consecutive selections.

player functions, but requires that a "*" key be pressed concurrently with each button when commanding the B225. If the remote is to be used only with the CD player, it can be modified so that the "*" key need not be pressed.

The rear panel of the B225 is equipped with fixed- and variable-level output-jack pairs, a power-cord receptacle and a multi-pin remote socket for connecting a wired remote control. Connecting such a remote automatically disables the infrared receiver.

Reading about all the B225's controls may perhaps intimidate you a bit—when I first read the owner's manual, before actually using the deck, I figured I'd need several hours to master everything. In fact, once I started dealing with this magnificent product, I was able to use and program it almost immediately—that's how well the panel is laid out, and how succinctly and clearly the controls are labelled.

Measurements

After marvelling at the extraordinary flexibility of this beautifully crafted machine, I got down to measuring its actual performance. As I have found again and again over the years, Revox's published specifications were unusually conservative. Figure 1 shows a plot of frequency response for both the left and right channels of the B225. The vertical scale is 2 dB per division, and the sweep, from left to right, extends from 20 Hz to 20 kHz. Frequency response was extremely flat, deviating by no more than ±0.2 dB. Harmonic distortion for maximum output varied from 0.003% to around 0.006%, depending upon the test frequency being measured. A plot of THD versus frequency up to around 10 kHz, at various recorded levels, is shown in Fig. 2.

Unweighted S/N measured 98.6 dB (Fig. 3A) while, with A-weighting, it increased to 102 dB (Fig. 3B). At maximum recorded level, IM distortion measured 0.0055%, increasing to 0.065% at −20 dB recorded level. Linearity was accurate to within 0.2 dB down to −80 dB. Stereo separation (Fig. 4) ranged from 80 dB at the low and high frequency extremes to around 89 dB at mid-frequencies.

Reproduction of a 1-kHz, digitally generated square-wave signal is shown in Fig. 5. The reproduced waveform is typical of that obtained with CD players that use digital filtering ahead of their D/A converters, as this one does. (The filters used here are Revox's own design.) Playback of a digitally generated unit-pulse signal was also typical of players using this type of filtering (Fig. 6). The 'scope photo of Fig. 7 shows negligible phase shift between a left-channel, 200-Hz test signal and a right-channel, 2-kHz one. It should be noted that the B225 has two independent D/A conversion circuits, which eliminate one source of time delay or phase differential between channels.

Use and Listening Tests

In their white paper on the technology of the B225, Revox claims the unit "doesn't mistrack, even in very stressful situations," thanks to its pivoting-arm laser assembly. As to error-correction, the paper claims that "The B225 plays all damaged records. It is the only CD player capable of this." The only restriction cited is that "Discs in very bad shape (broken, pierced, scratched all over the surface) will still be perfectly reproduced, but cannot be programmed."

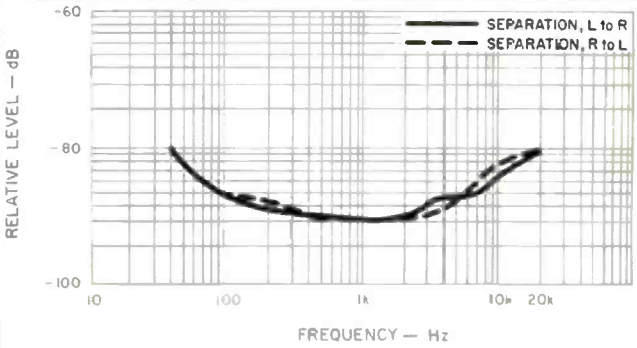


Fig. 4—Separation vs. frequency.

Fig. 5—Square-wave reproduction, 1 kHz.

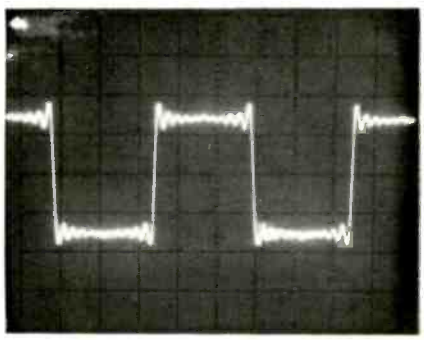


Fig. 6—Single-pulse test.

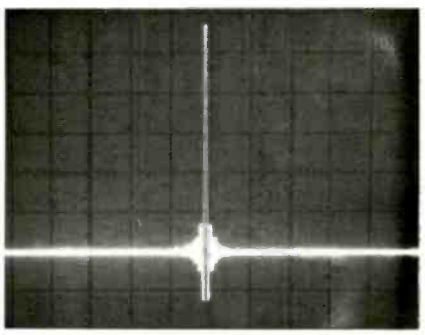
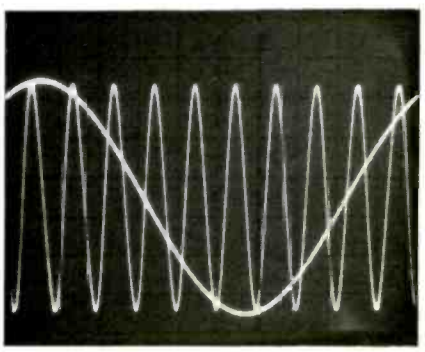


Fig. 7—Two-tone phase test (200 Hz left channel, 2 kHz right).



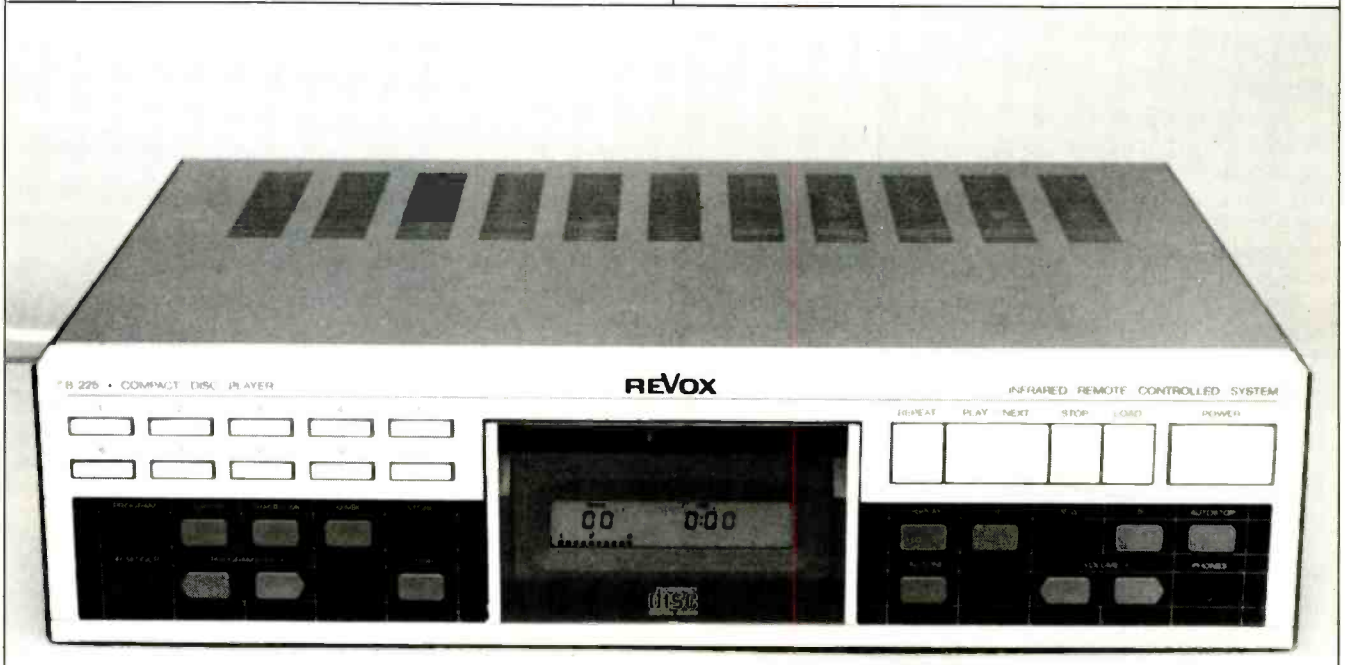
Revox claims the B225 can play even the most badly damaged Compact Discs. The only restriction is in programming.

Well, I wasn't about to break, pierce, or scratch all over their surfaces any of my favorite musical CDs to prove the point, and I suspect that even at Revox, copywriters can get to be a bit over-enthusiastic. This much I can say, with certainty, however. The Revox B225 had no trouble whatsoever playing through (and ignoring) all of the defects built into my special Philips test disc. That means that it was able to correct for dropouts extending to 900 microns in length, simulated dust or dirt spots 900 microns in diameter, and a long, semi-opaque simulated fingerprint smudge. I must also confess that I was a bit more brutal than usual in my "tapping tests" along the sides and top of this rugged unit, yet still I failed to cause any mistracking during these "shock tests."

If you are looking for a CD player that doesn't occupy very much space on your shelf or table top, this is probably not the unit for you. There are CD players around that are much smaller in size and lighter in weight. If, however, you are looking for a CD player that is more versatile in its programming capabilities than just about any other player available, you would do well to consider the long-awaited Revox B225 very seriously. I have been an admirer of Revox and Studer products for many years and have been privileged to visit the Studer factories in Switzerland and Germany and to meet and talk with the company's legendary founder, Dr. Willi Studer. Having had the pleasure of listening to Dr. Studer explain his philosophy of product design and quality, I expected nothing less than sonic and mechanical perfection from the company's first CD player.

I was not disappointed in the least. Sound quality was beyond reproach. I know that in the past I have repeatedly stressed that there is little audible difference between one CD player and the next. Nevertheless, I felt that the Revox B225 sounded cleaner; instruments seemed better defined during ensemble playing and in orchestral works. Stereo imaging was magnificent when I played some of my most recent CD acquisitions. I wondered whether my positive reaction to the sound of this player was purely psychological (stemming from my admiration for the engineering and layout of the instrument) or whether it was, in fact, the result of an audible difference between this CD player and others I have tested. I suppose I will never really know. The ease with which complex programming could be accomplished on this superbly engineered machine seemed a fitting accompaniment to the high technology involved in the actual playing and tracking of CDs. All in all, the Revox B225 is a superb instrument. I simply can't find anything to criticize, nor can I think of a single feature or control that I would have arranged differently. As is usual with Revox where new designs are concerned, it took the company quite a long time to come up with their first CD player. But it was certainly worth waiting for!

Leonard Feldman



The panel follows a logical layout, with programming controls grouped to the left of the display and disc drawer, and more often-used controls to the right.

BEYOND CONVENTIONAL CD PERFORMANCE

Onkyo's Integra DX-200 Compact Disc Player sets a new standard of CD performance, both in sonic fidelity and user convenience.

When comparing CD players, the digital-to-analog (D/A) conversion method is the key factor, for although the sound on the disc itself is digital, the CD player must convert it to analog for output to the amplifier. If this is not accomplished perfectly, the chief benefit of digital—far greater dynamic range with a total absence of noise—will not be realized. That's why Onkyo utilizes a 16 bit D/A converter system that exactly matches the 16 bit digital code used in the recording process, along with specialized double over-sampling and digital filtering techniques.

Four separate power supplies eliminate interaction between stages, and exclusive Delta Power and Super Servo circuitries maintain noise & distortion free reproduction. A precision 3-beam laser pickup assures precise tracking with fast track access.

A full complement of convenience features includes 16 track random memory, with complete digital display for track, index, elapsed/remaining time, and memory contents, all of which can be controlled by the DX-200's wireless remote unit.

The Integra DX-200 goes beyond conventional CD performance to let you realize the promise of digital as it was meant to be heard. Discover the audible difference today.

Artistry In Sound

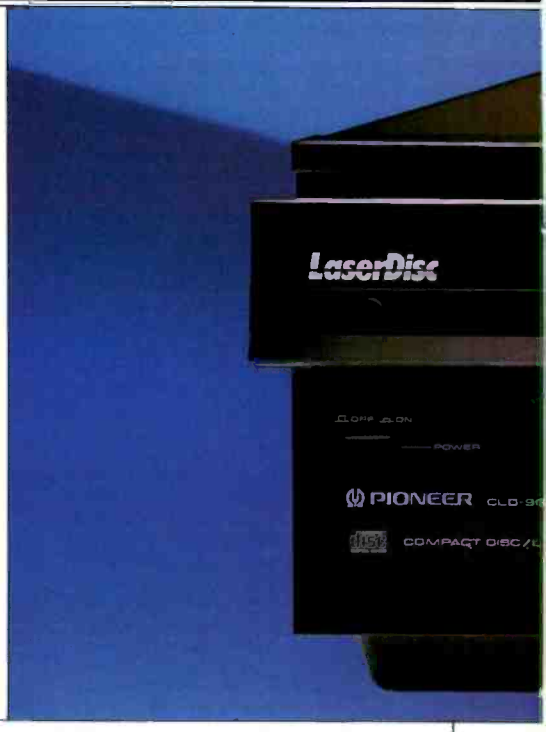
ONKYO®

200 Williams Drive, Ramsey, N.J. 07446

2

PIONEER CLD-900 COMPACT DISC/ LASERDISC PLAYER

Manufacturer's Specifications
CD Player Section Only
Frequency Response: 5 Hz to 20 kHz, ±0.5 dB.
S/N Ratio: 96 dB.
Dynamic Range: 96 dB.
Channel Separation: 94 dB.
THD: 0.003% at 1 kHz.
Output Level: 2.6 V at 0-dB level.
Power Consumption: 42 watts.
Dimensions: 16½ in. (42 cm) W × 6⅝ in. (16.8 cm) H × 17-9/16 in. (44.7 cm) D.
Weight: 35 lbs., 3 oz. (16 kg).
Price: $1,200.
Company Address: Pioneer Video, 200 West Grand Ave., Montvale, N.J. 07645.
(Originally published February 1985)



It was bound to happen sooner or later. Nearly two years ago, I was speaking to Bart Locanthi, a leading technical executive with Pioneer on the West Coast. Even then, he hinted that the presence of a common element—the laser pickup—in CD players and LaserVision videodisc players suggested that a player could be built to handle both types of program sources. At the recent Japan Audio Fair, held in Tokyo in the fall of 1984, Pioneer demonstrated the first such combination player. A month or so later, I was given a production prototype of the machine as it will be marketed in the United States early this year.

What Mr. Locanthi failed to tell me during our discussion was that it is possible to record the soundtracks on a LaserVision videodisc using the digital-audio CD format, and that such discs would become available when the combination player became a reality. Indeed, that is just what has happened. With this first combination CD/LV player I was given a videodisc which contains not only the AFM (audio frequency modulation) audio tracks which have been the standard all along (it is similar to the AFM technique used in Beta Hi-Fi and VHS Hi-Fi, and is therefore of excellent quality), but also contains CD audio, totally digital. Incorporating both kinds of audio is, of course, essential for compatibility, but on a player such as the new Pioneer CLD-900, the sound reproduction can be of the quality and dynamic range of CDs.

Pioneer has taken advantage of the more obvious similarities between videodisc and Compact Disc players, but they have gone beyond that. I was as impressed by the clever way in which they have assigned dual functions to the buttons on the supplied wireless remote-control unit as I was by the design of the actual player itself. The designers of this incredible instrument assumed (rightly, I believe) that when playing a Compact Disc you would still have the video output of the unit connected to your TV set or video monitor. This being the case, they arranged for that video screen to display all the information sometimes found on CD players. Therefore, the front panel of the CLD-900 remains relatively uncluttered, considering the great number of operational modes it supports.

As for the LaserVision features, they are just about the same as those found in Pioneer's dedicated videodisc players, such as their Model LD-700. The same wireless remote

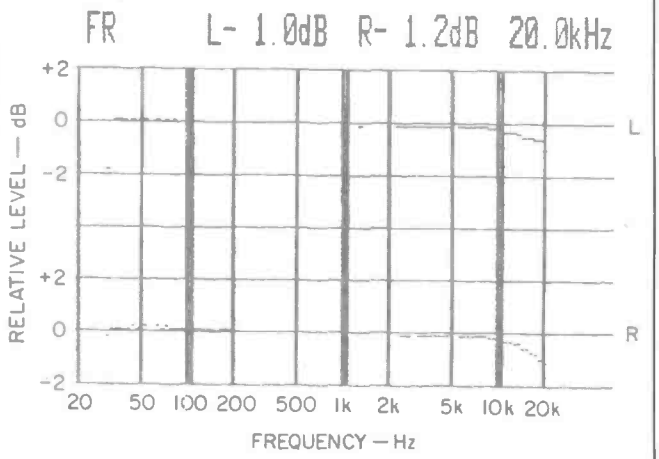


Fig. 1—Frequency response, left (top) and right channels, at 0-dB level.

Photograph: Ross Elmi

used when playing Compact Discs also controls such video special effects as freeze-frame, single-frame advance, slow motion, fast motion, and random access to individual frames by number. These effects, however, are available only with CAV (Constant Angular Velocity) discs, which play for 30 minutes per side, not with the more common, hour-per-side CLV (Constant Linear Velocity) discs. Like the LD-700, the CLD-900 is front-loading and handles either 12-inch or the newer 8-inch discs in CAV or CLV formats. Molded ridges inside the loading drawer help you to properly position both sizes of LaserVision discs as well as the 12-cm (4.7-inch) CDs before you push the drawer closed and begin play.

Control Layout

Most of the upper front panel is taken up by the disc loading drawer, which is opened by pressing the "Eject" button near the right edge of the panel or on the battery-operated, infrared remote control. Below the drawer, at the left, are a power on/off button and a stereo headphone jack. The TV video selector button is located near the center of the panel, next to the CX noise-reduction on/off switch. This form of dynamic noise-reduction circuitry, found on earlier LaserVision players, is used only when playing CX-encoded discs. The switch won't do anything if you play a future LaserVision disc with CD digital audio tracks, since no noise reduction would be needed with these already noise-free discs. Whether you are playing CDs or LV discs, a multi-function display lets you know what's happening: Numerals tell what CD track you're hearing or which LV "chapter" you are watching. Illuminated words tell you whether you are in the "Pause" or "Play" mode, whether soundtracks are digital or analog, whether you have selected one of the repeat-play features (and, if so, which one), and whether

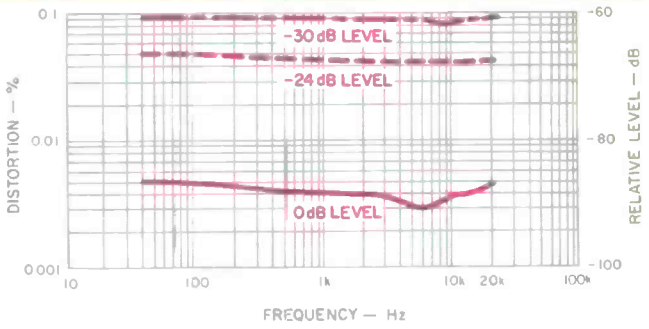


Fig. 2—THD vs. frequency at three signal levels.

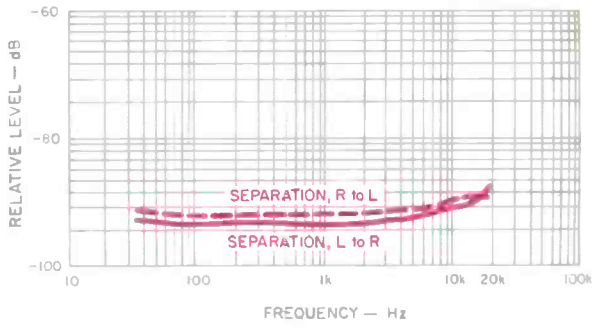


Fig. 3—Separation vs. frequency.

CD and LaserVision now have more than just lasers in common: LaserVision discs with CD-format audio tracks are coming soon.

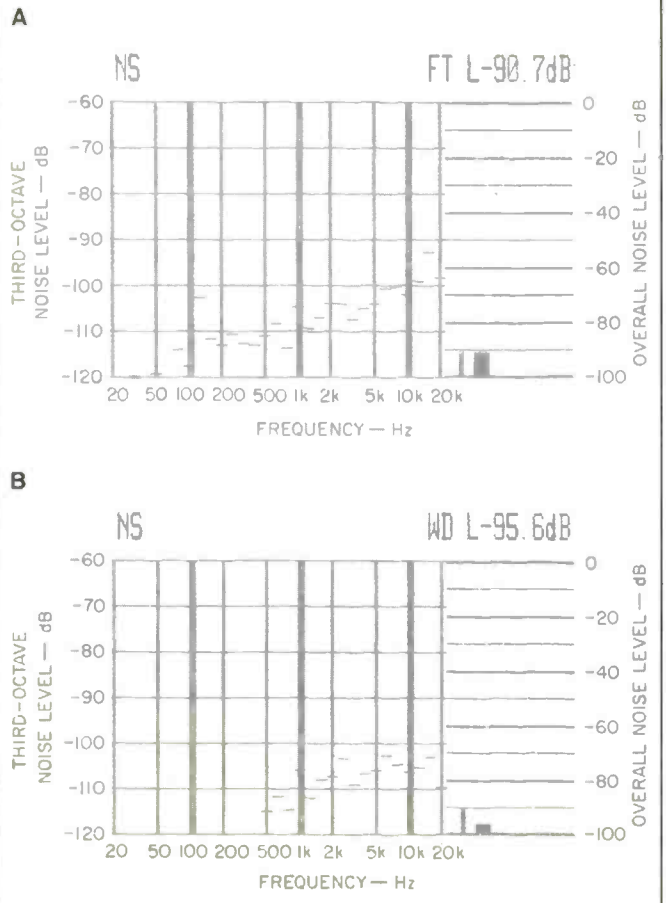


Fig. 4—S/N analysis, both unweighted (A) and A-weighted (B).

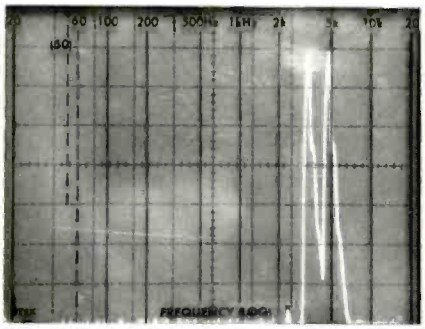


Fig. 5—IHF twin-tone IM test (14 and 15 kHz) showed 0.03% distortion—more than usual, but still minute.

audio is left-channel, right-channel or stereo. Additional small indicator lights tell the viewer whether the CX noise-reduction mode has been selected and whether or not an extended-play (CLV) videodisc is being viewed.

The more sophisticated special-effects and programming features available on the CLD-900 are accessible only via the hand-held remote control. It is this little module which lets you quickly access a specifically numbered "frame" on a videodisc (as many as 54,000 frames can fit on one side of a standard-play LV disc), choose one of several slow-motion or fast-motion viewing speeds, go into freeze-frame or frame-by-frame viewing, access a given chapter of an LV disc, quickly scan forward or backward to find the scene you want to watch, or turn on displays (superimposed on the picture you are watching) that show the chapter as well as the frame being viewed. When playing a CD (audio-only) disc, most of the touch buttons used for videodisc special effects and programming serve similar functions. You can access tracks or index points (if the latter are encoded on the disc you are playing). You can fast-scan the music (the music remains audible and *does not* change pitch while you scan), and of course, you can turn on the additional displays, visible on your video screen, that tell you the time into the track you are playing, the remaining time of the entire disc, and even the total time of the disc. Repeat-play, either from one point to another or for an entire track or disc, is possible both for LaserVision and Compact Discs.

Measurements

For the purpose of this report, I concentrated primarily on the CLD-900's audio performance as a CD player. I was unable to measure its audio performance with either the analog or digital soundtracks of LaserVision discs, as I was unable to obtain a suitable test disc.

As to the video performance, let me simply reiterate something that's been said by many others, many times: The LaserVision videodisc format gives you the very best picture presently available on a home video screen. Picture resolution surpasses what you can get with the best models of videocassette recorders, even at their fastest tape speeds. I would hope, personally, that now that the LaserVision's video virtues can be combined with the benefits and fidelity of Compact Discs, perhaps more people will come to recognize just how great the combination of crisp video pictures on a good TV monitor plus digitally recorded and reproduced stereo audio can be.

Having said that, let me go on to the CD player measurement results. Figure 1 shows the playback frequency response for the left and right channels. The vertical scale is 2 dB per division so as to highlight any small deviations from ruler-flat response. There were none to speak of, and, with the cursor of the graph set to read relative output at 20 kHz, the readings were only off by 1.0 and 1.2 dB for the left and right channels respectively.

Harmonic distortion at mid-frequencies, for maximum recorded level, measured 0.004%, remaining essentially at that low level over the entire audio spectrum. There was no evidence of any superaudible "beats" such as those I have found with so many other CD players. In fact, for a 20-kHz test tone, the single THD reading (which normally rises as a

Since this dual-purpose player will normally be hooked to your TV set or video monitor, it displays CD information (such as elapsed time) on the screen.

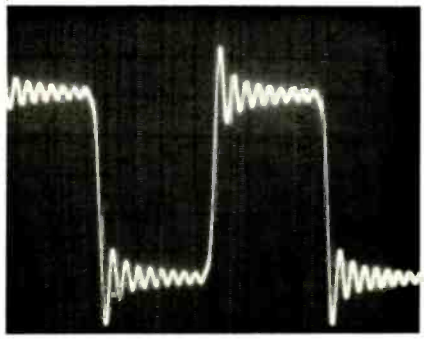


Fig. 6— Square-wave reproduction, 1 kHz.

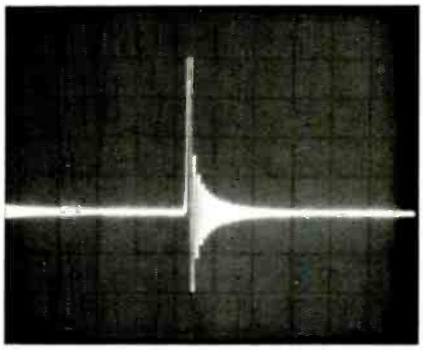


Fig. 7— Single-pulse test.

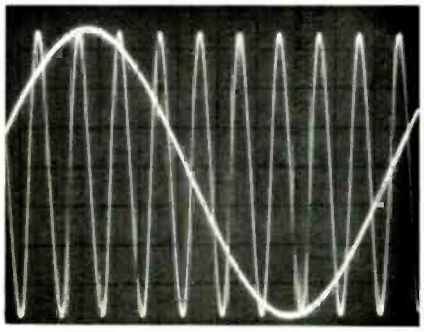
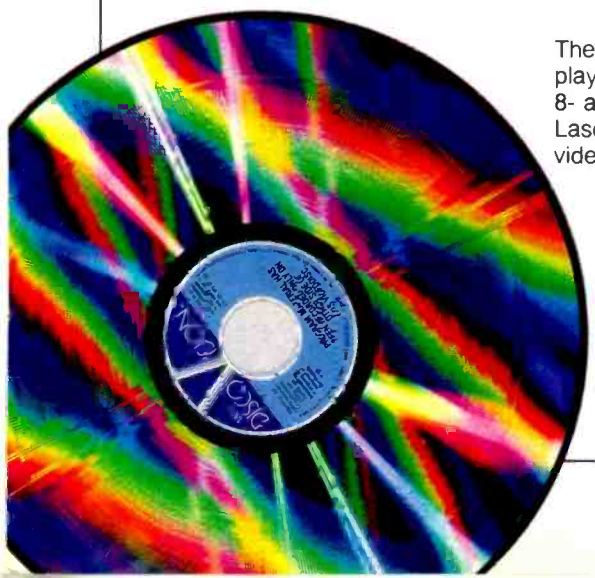


Fig. 8— Twin-tone phase-test signals (200 Hz and 2 kHz) showed negligible phase shift in CD player section.



The CLD-900 plays CDs plus 8- and 12-inch LaserVision videodiscs.

result of non-harmonically related beats) remained a low 0.0045% at 0-dB (maximum) signal level. Figure 2 shows distortion versus frequency for maximum recorded level (0 dB) as well as for levels of −24 and −30 dB. As usual, the THD increases at lower output levels: At the −30 dB recorded level, THD for a 1-kHz signal measured 0.09%.

Output linearity was accurate to within 0.3 dB down to 80 dB below maximum recorded level. Stereo separation or crosstalk is shown in Fig. 3 and was extremely uniform over the entire range of test frequencies used. As with many other CD players, there was only a minimal decrease in separation at the frequency extremes. This suggests that the analog output stages of the player have been designed with good isolation between left and right channels.

Signal-to-noise ratio, measured without any weighting network, was 90.7 dB, increasing to an even higher 95.6 dB when an A-weighting network was introduced in the measurement path. An analysis of the noise content as a function of frequency distribution is shown in Figs. 4A and 4B.

The SMPTE-IM distortion was a low 0.004% at maximum recorded level, increasing to 0.012% at −20 dB recorded level. The CCIF (twin-tone) IM, using signals at 19 and 20 kHz, measured only 0.002% at the equivalent of maximum recorded level and 0.0028% at −10 dB.

I thought it more significant that I detected a small amount of IHF-IM distortion. At 0.03%, it was still minute, but on most CD players, IM is too low for my equipment even to measure. Figure 5 shows what happens when the player reproduces the IHF-IM test's twin tones. The two tall spikes represent the 14- and 15-kHz test tones, while the small spike just to their left is a spurious signal, 1 kHz lower. (The sweep here is linear, at 2 kHz per division.) The amplitude of this spike is approximately 70 dB lower than the composite of the two test tones, or 0.03%.

Square-wave reproduction of a 1-kHz, digitally generated square-wave signal (Fig. 6) was typical of that produced by CD players that use multi-pole, analog output filters, as was the reproduction of the unit pulse (Fig. 7). With a 200-Hz signal reproduced from the left channel and a 2-kHz signal coming from the right channel, there was little evidence of phase shift between the higher frequency and the lower one. Perfect phase relationship would be indicated by both sine waves in Fig. 8 crossing the zero axis in a positive-going direction at the same time—a condition which occurs near the right side of the 'scope photo of Fig. 8.

The CLD-900 was able to "read" through all of the built-in defects in my special Philips error-correction and tracking test disc. Specifically, it ignored 900-micron linear distances of missing information as well as 800-micron diameter simulated dust particles (actually black dots embedded beneath the surface of the test disc) and semi-opaque, simulated fingerprint smudges. This unit played the various musical tracks encoded beneath the defects without any muting and without skipping of any kind.

Use, Listening and Viewing Tests

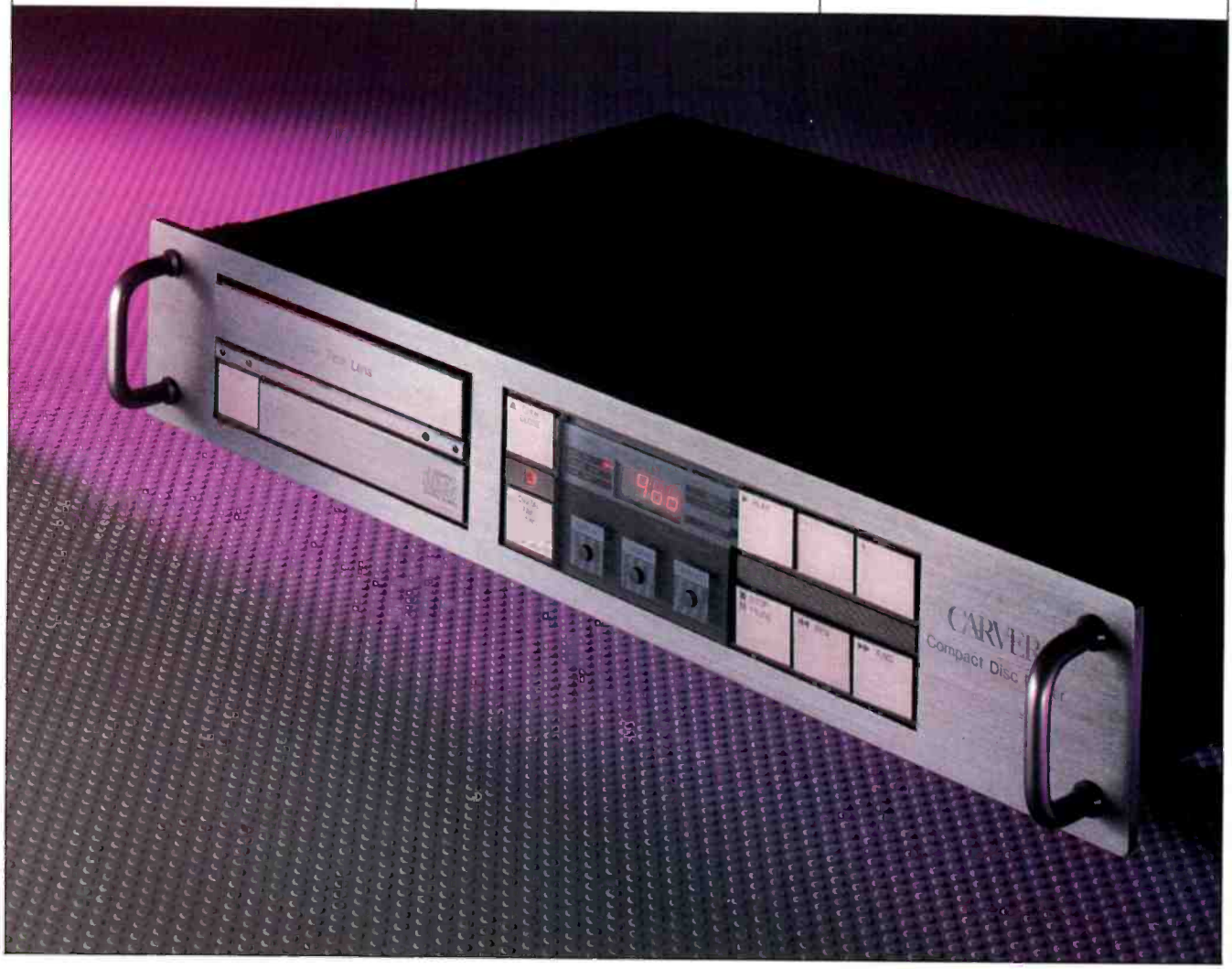
Besides the usual assortment of favorite CDs that I use to evaluate the sonic performance of CD players, I listened to, and watched, the single LaserVision disc I had borrowed

Continued on page 60

3

THE CARVER COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 5 Hz to 20 kHz, ±0.5 dB.
S/N Ratio: 96 dB.
Dynamic Range: 96 dB.
Channel Separation: 60 dB.
THD: 0.05% at 1 kHz.
Output Level: 1.9 V at 0 dB.
Number of Programmable Selections: 99.
Power Consumption: 26 watts.
Dimensions: 19 in. (48.3 cm) W × 3 7/16 in. (8.7 cm) H × 11¼ in. (28.6 cm) D.
Weight: 13 lbs. (5.9 kg).
Price: $650.
Company Address: P.O. Box 1237, Lynnwood, Wash. 98036.
(Originally published March 1985)



Photograph: Robert Lewis

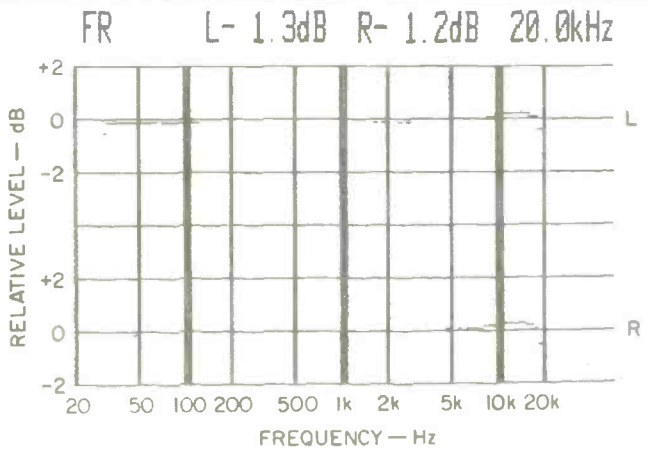


Fig. 1—Frequency response, left (top) and right channels, with Digital Time Lens off.

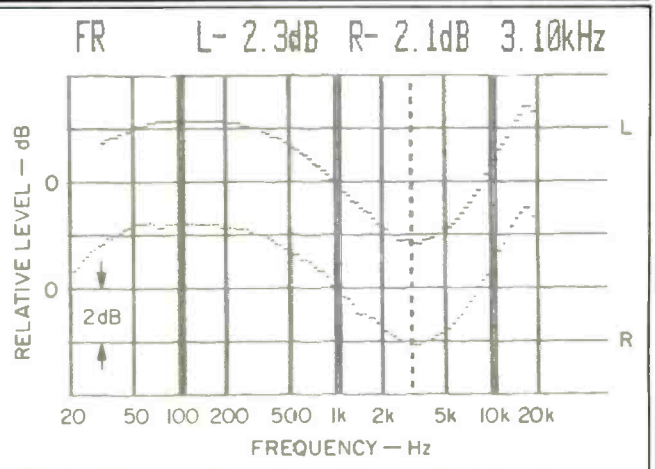
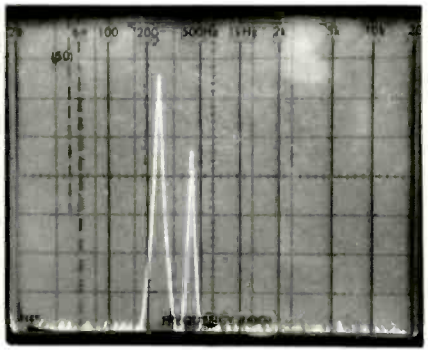


Fig. 2—Same as Fig. 1 but with Time Lens on. Bass peaks shown measure +2.3 to +2.4 dB at 145 Hz, treble dips are −2.1 to −2.3 dB at 3.1 kHz. Note also treble peak just below 20 kHz.

Leave it to Bob Carver to come up with a CD player designed to please both those who love CDs and those who still have reservations about their sound quality. Carver, one of the true innovators in the audio industry, has given us such "magical" signal-processing circuits as the Autocorrelator (a single-ended noise-reduction circuit), Sonic Holography (a space-expanding stereo system), Magnetic Field Amplification, the Asymmetrical Charge-Coupled FM Stereo Detector (for better FM stereo reception), and now, the Carver Digital Time Lens, intended to satisfy those who maintain that LPs sound better than CDs. The names of these audio innovations don't tell you much about what the circuits actually do. The fact is, though, that these circuits *do what Carver intends*, and they do it very well indeed. His newest, the Digital Time Lens, is no exception. But before I get into that unit in detail, let's have a look at the way Carver has put together his first CD player, which, like his receiver, carries no model number—only the appellation *The* Carver CD Player (emphasis mine).

Fig. 3—Spectrum analysis, 0 Hz to 50 kHz, showing 20-kHz tone (tall spike) and spurious beat tone (small spike) at 24.1 kHz.



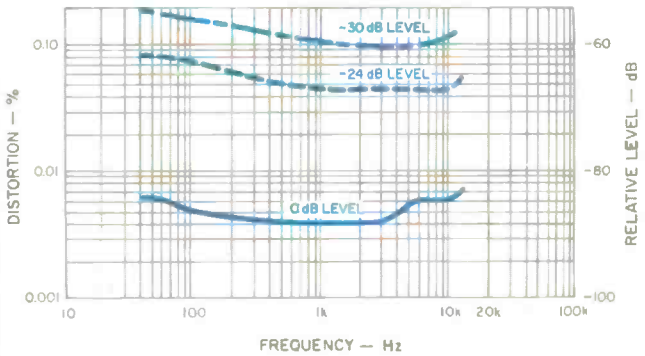


Fig. 4—THD vs. frequency at three signal levels.

Control Layout

The player's front panel conforms in size and color to several other Carver products, featuring a 19-inch-wide front panel equipped with handles and finished in a subdued charcoal gray. Carver continues to insist upon using what I call "black on black" printed nomenclature on his front panels. It's almost invisible unless light hits the panel at just the right angle. For a reviewer such as myself, this can be frustrating at times, as I strain to find the right buttons to push. However, for an owner of the equipment, who becomes accustomed to the various controls' positions, it should pose no problem. In fact, it makes for a very subdued-looking panel which fits in with home decor much better than some of the garishly inscribed panels I have seen.

Other than the two handles, there are no protrusions on the front panel whatever. The CD drawer at the left is opened by touching a square touch pad on the right of the

Carver is a true innovator. His circuits have strange names, but they do what they're supposed to, and they do it very well.

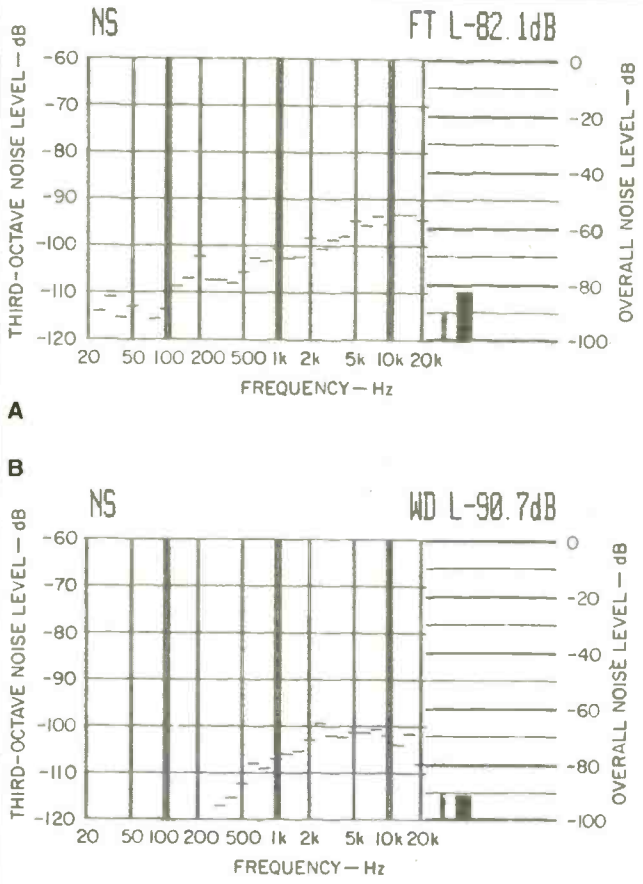


Fig. 5—S/N analysis with Digital Time Lens adding dither, both unweighted (A) and A-weighted (B).

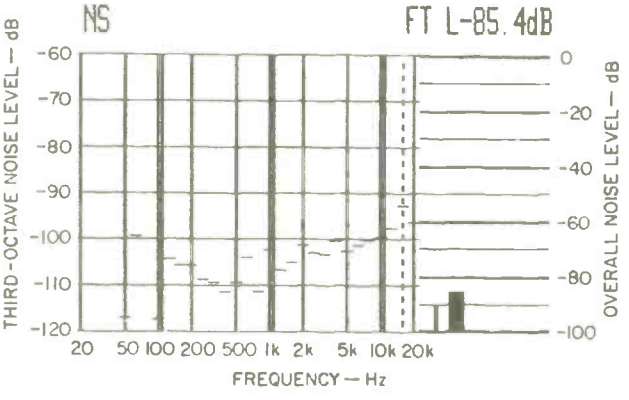


Fig. 6—Unweighted S/N analysis, without added dither.

drawer; it's closed either by touching that button a second time or by touching the drawer itself. The on-off button is located below the disc drawer. A pushbutton below the "Open/Close" button activates Carver's Digital Time Lens (about which I will have much more to say in a few moments). When the "Digital Time Lens" button is depressed, a light above it indicates that this circuit is in use. An LED display near the panel's center alternately displays track number or elapsed time within the track. When a disc is loaded into the disc drawer, the display first shows the total number of tracks on that disc and can then be switched to show total time on the disc. When you're programming, the display shows both the current track or index number and the current program slot—i.e., "16P 3" indicates that you've programmed track 16 as the third of the 99 possible program selections.

Although the display is really a simple numeric one, Carver has managed to program the eight-segment LEDs so that they also provide useful "alpha"-type data. When power is first turned on, the laser pickup does some searching, while the display blinks with a few dashes ("----"). If no disc is located, the word "dISC" begins to flash intermittently. When the door is opened, the word "OPEn" appears. After your programmed selections have been played, or the programming is completed, the word "End" appears. Below the display are three small pushbuttons, labelled "Display" (for switching between elapsed time and track number), "Program" (for initiating program mode and storing each of the track numbers to be played) and "Repeat" (for programming repeat-play of a given disc or group of tracks that have been selected).

Six more touch pads or buttons, to the right of the display, initiate play, track-by-track reverse or advance, stop/pause, fast-reverse and fast-forward (with muted but audible cueing). The track-by-track and cueing buttons are clustered in a square, for convenient shuttling between tracks and locations. These buttons have auto-repeat, so if you wish, for example, to jump ahead by 40 tracks, just hold down the track-advance ("+") button. The display will show track numbers advancing faster and faster until you lift your finger—"warp drive," Carver calls it, though slewing is more usual.

Loading a disc in the drawer and pressing "Play" will close the drawer and start the player. If you press "Open/Close" instead (or simply nudge the drawer itself), the drawer will close and the player will scan the disc to locate its tracks, but play will not begin until you press the "Play" button.

You can begin programming a disc even before the drawer has closed. Press the "Program" button to get into the mode, then press the "+" button to advance to the desired track. If you overshoot, just press the "−" button. (The forward and reverse buttons perform the same functions, but for index points, not tracks.) Pressing the "Program" button once again stores your selection, blanks the left (track/index number) side of the display, and changes the right side from "P 1" to "P 2" for your next selection.

There is no output-level control and no headphone jack. The rear panel carries only the usual pair of output jacks and the power cord.

The Time Lens will add depth and warmth to those CDs that need it. But I wish it could add each of them separately.

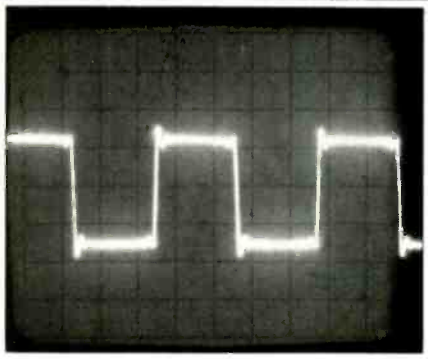


Fig. 7—Square-wave reproduction, 1 kHz.

Measurements

Because of the Digital Time Lens in this CD player, some of my usual measurements had to be taken twice. For example. Fig. 1 shows the normal frequency response of the player without the addition of the special circuit. It is flat to better than ±1.0 dB to 20 kHz. The vertical scale in this graph and in Fig. 2 has been expanded to 2 dB per division, to show even slight deviations from flat response. Figure 2 shows what happens to the response when the Digital Time Lens is switched in. Note that the equalization circuit adds a bit less than 2.5 dB of boost at 145 Hz and just over 2 dB of treble cut at 3.1 kHz.

Harmonic distortion at mid-frequencies, for maximum recorded level, measured 0.0045%, rising insignificantly to around 0.006% at the bass and treble frequency extremes.

THE DIGITAL TIME LENS—THEORY AND PRACTICE

Bob Carver, along with many others, was displeased by the sound of the earliest CDs and decided to find out *why* some didn't sound the same (or, some say, as good) as the LP versions of the same recordings. Unlike many who have complained about poor stereo imaging, lack of depth and strident, harsh treble—and who have blamed the CD digital system itself—Carver was enough of a mathematician and engineering theorist to know that the *system itself* was inherently blameless.

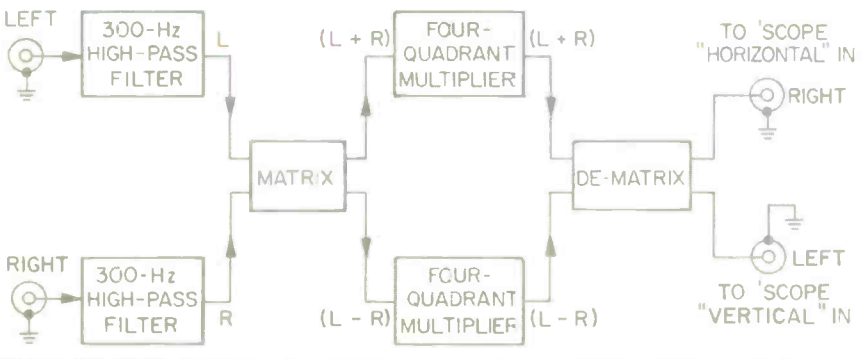
After extensive comparison tests between LPs and their CD versions, which included time-synchronized playings of both types of record while measurements and observations were made, Bob Carver concluded that there were two major differences between certain CDs and their LP equivalents. The first had to do with stereo depth or separation. In any stereo program, the stereo effect is transmitted by the difference between left and right signals (L − R), while the sum of the two signals conveys the mono information. Bob discovered that many CDs have less relative L − R information (compared with the quantity of L + R signal) than do the LPs of the same programs, at the same musical moment.

This difference is not great—often no more than 1 dB or so. In fact, in order to see it on an oscilloscope, Carver had to devise a special test circuit that would amplify the difference. A block diagram of that test circuit is shown in Fig. B1, just in case more ambitious readers want to duplicate Carver's experiments. The four-quadrant multipliers in Fig. B1 expand the output voltages instantaneously so that the Lissajous patterns obtained by connecting the left and right outputs to the vertical and horizontal inputs to an oscilloscope will be easier to interpret. The differences in patterns obtained are, in effect, raised to the second power and become proportional to the output *power* (rather than voltage) or energy into the listening room. (The matrix and dematrix blocks in the diagram represent M-S encoding and decoding matrices.)

The next two figures show the Lissajous patterns obtained from the same instant of musical program in its LP (Fig. B2) and CD (Fig. B3) versions. In this type of Lissajous display, a straight, thin, diagonal line from the lower left to the upper right would represent a purely monophonic signal. The more stereo "difference" information there is, the more the line spreads out into an ellipse. Notice that there is significantly more difference (L − R) signal in the LP version of the music!

The second major difference between some CDs and their LP counterparts noted by Carver during his research was a difference in equalization, or the overall frequency response. Using a fine moving-coil cartridge to play the LP versions of cer-

Fig. B1—Block diagram of circuit used to emphasize and view changes in (L − R)/(L + R) ratios.



The difference in LP and CD stereo separation isn't great; it takes a special circuit to make it visible on a 'scope.

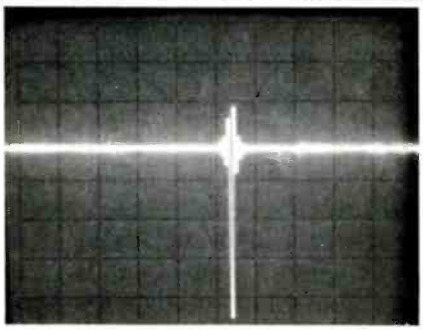


Fig. 8—Single-pulse test.

When I didn't use a band-pass filter for the harmonic distortion measurements, the readings were much higher—caused not by actual harmonic components but by the usual out-of-band component generated by the combination of a high-frequency test signal on my test disc and the 44.1-kHz sampling frequency of the CD system itself. This effect is seen in Fig. 3. The tall spike at left is the desired 20-kHz output, while just to the right is another signal, at 24.1 kHz (the difference between 44.1 and 20 kHz), which is only around 22 dB lower. I suspect that the high (though inaudible) amplitude of this spurious signal is caused by Carver's use of gentle, analog, output filters which roll off slowly above 20 kHz. He is able to use such gentle filtering because, like so many other makers of CD players these days, he has elected to use oversampling and digital filtering before D/A conversion.

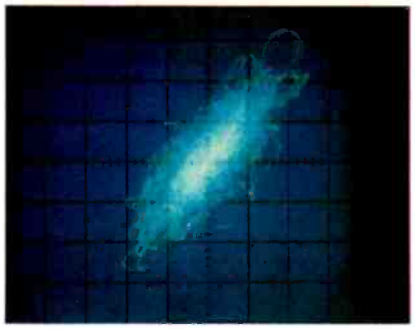


Fig. B2—Lissajous pattern showing (L − R)/ (L + R) ratio from an LP record.

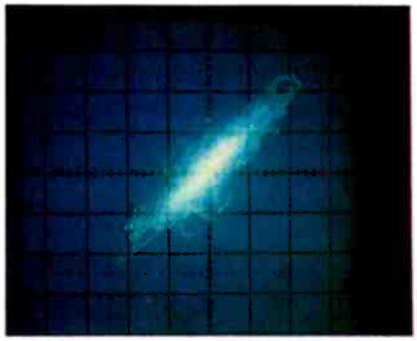
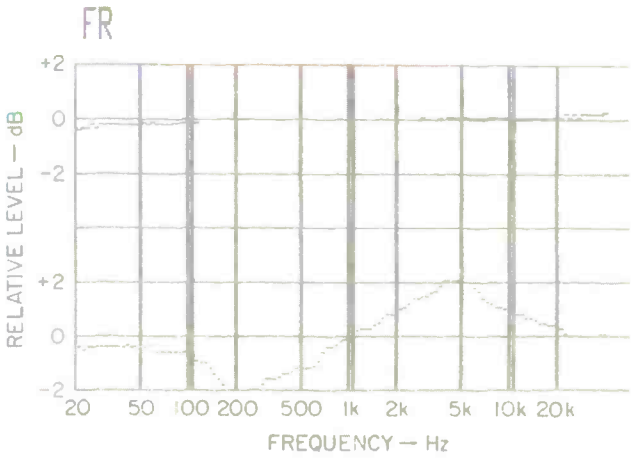


Fig. B3—The same instant of music as in Fig. B2 but taken from the CD version. Note the decreased difference (L − R) content, as shown by the narrowed trace.

tain programs, Carver noted that there was a slight boost in the mid-bass region and a slight cut in the mid-treble region *compared with the response obtained when playing the CD version of the same program*. The average difference is shown in Fig. B4, where the straight-line response is arbitrarily taken as the response of the LP version, while the other curve shows the response of the CD *relative* to that reference response.

Carver's objective in designing the Digital Time Lens was to give the user the ability to introduce the converse of these two effects, at will. That, essentially, is what he has done: If there is a deficiency of L − R signal in some CDs, the user can interpose a form of matrix-dematrix circuitry that will put back some extra L − R signal. If there is overly bright mid-treble and somewhat diminished mid-bass in a CD, the user can add a little mid-bass and attenuate some mid-treble frequencies by means of a switchable circuit. The important thing about the Digital Time Lens, as Carver points out, is that it is switchable. There are some CDs that will not benefit from its use (says Carver) since they are recorded well and are musically pleasing. For those that do require the kind of compensation that the circuit provides, The Carver CD Player lets you introduce it. A block

Fig. B4—Relative frequency response of a recording in its CD (lower trace) and LP (upper trace) versions, using the LP as a reference arbitrarily assumed as "flat."



Well-recorded CDs, Carver says, won't benefit from the Digital Time Lens. That's why it's switchable.

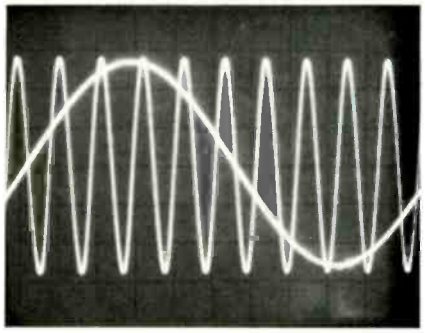


Fig. 9—Two-tone phase-test signal (200 Hz and 2 kHz) with Digital Time Lens off.

Figure 4 is a graph of distortion versus frequency for maximum recorded levels as well as for levels of −24 and −30 dB. At the −30 dB level, turning on the Digital Time Lens circuit resulted in higher distortion meter readings (not shown in the graphs). It was clear from 'scope observations, however, that this was not an increase in actual harmonic distortion, but rather the distortion meter's mistaking the added dither noise (see Sidebar) for new distortion components. The dither is about 82 dB below maximum recorded level, but that's only 52 dB below a −30 dB recorded signal. So, relative to such a lower level signal, the noise represents a level that is 0.25% of the signal level. And, sure enough, that's exactly the level of "distortion" that my distortion meter thought it was reading.

Output linearity was accurate down to −60 dB, within 1.0

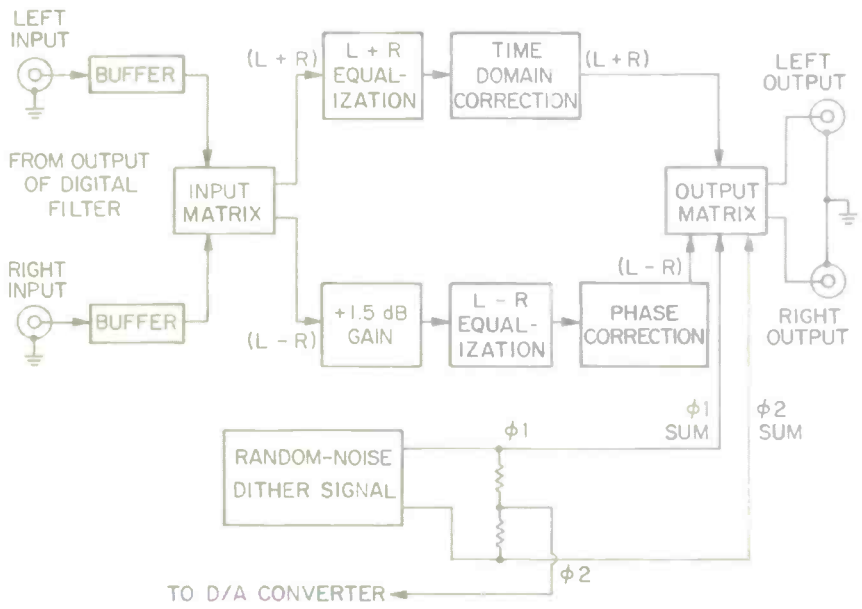


Fig. B5—Block diagram of the Carver Digital Time Lens.

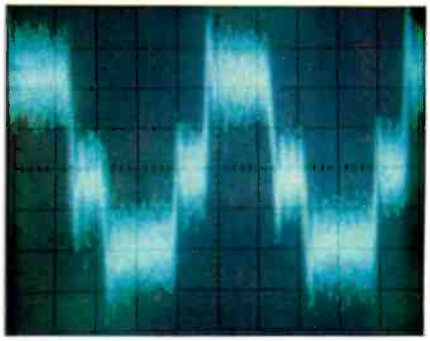


Fig. B6—Ultra-low-level (4-bit), 1-kHz signal, as reproduced by conventional CD players.

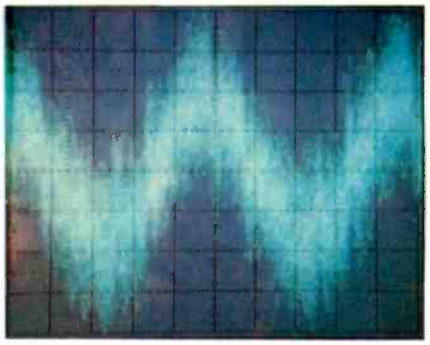


Fig. B7—Same as Fig. B6, with dither added before D/A conversion.

diagram of the Digital Time Lens circuit is shown in Fig. B5.

There is one "block" in Fig. B5 that I haven't talked about yet, the one labelled "Random-Noise Dither Signal." Carver admitted to me that he is not sure whether this feature of his Digital Time Lens really provides an *audible* benefit, but he could easily demonstrate its theoretical desirability. (See also "Digital Domain," *Audio*, November 1984.)

Without dither, very low-level signals are subject to very high distortion. Take, for example, Fig. B6, which shows the output of the Carver CD Player reproducing a 1-kHz signal at 90 dB below maximum recorded level, close to the CD system's noise floor. This waveform is typical of all CD players, and shows clearly the step-like approximation that defines the 1-kHz tone. The "steps" are clearly visible because, in digital

The Digital Time Lens misleads meters, showing more distortion where you hear less, and less separation where you hear more.

dB. SMPTE-IM distortion measured 0.0025% at 0 dB (maximum) recorded level and 0.03% at −20 dB. The CCIR-IM (twin-tone) distortion was only 0.0037%; I could not detect any in-band distortion components during this measurement other than the basic, 1-kHz beat which constitutes the CCIR-IM component.

An analysis of signal-to-noise performance, both unweighted and weighted, is shown with the Digital Time Lens engaged in Figs. 5A and 5B. An analysis of unweighted S/N without the Digital Time Lens engaged is shown in Fig. 6. My tester would not plot an A-weighted S/N analysis for this condition, since the S/N was far over 100 dB.

Reproduction of a 1-kHz, digitally generated signal (Fig. 7) was about as close to a true square wave as I have ever seen from a CD player that used digital filtering. The unit-pulse test is shown in Fig. 8. Figure 9 shows a virtual absence of any phase error between a 200-Hz signal on one channel and a 2-kHz signal on the other. When there is zero phase shift between these two signals, the waveforms cross the zero axis in the same direction at the same time, and that is exactly what is happening in Fig. 9.

Figure 10 shows separation between channels with the Digital Time Lens deactivated. At midrange frequencies, separation was around 80 dB, decreasing to just under 60 dB at the extreme high frequencies. If you were to repeat my tests with the Digital Time Lens switched on, you would measure no more than about 15 dB of apparent separation! That's because when Carver increases L − R content with this circuit he does so by adding out-of-phase right signal to the left channel and out-of-phase left signal to the right

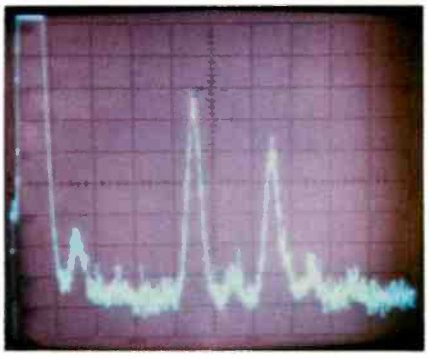


Fig. B8—Spectrum analysis of waveform shown in Fig. B6 shows high level of harmonic distortion components.

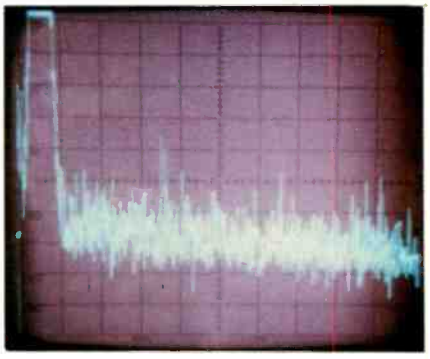


Fig. B9—With dither added, overall noise level increases, but distortion components vanish below the noise floor.

terms, there are only four bits left at this low level with which to describe the waveform.

By adding some random noise to such a signal, it is actually possible to reduce the high levels of distortion that would otherwise be present, by substituting *lower* levels of less-obtrusive, random ("white") noise. Figure B7 shows the same −90 dB, 1-kHz tone, this time with the Digital Time Lens circuit adding some dither noise. The noise is greater, but the step-like nature of the recovered signal has all but disappeared. In practice, the noise dither signal has been set about 12 dB above the system's noise floor.

That this really does represent decreased distortion is shown more clearly by spectrum analyses of the low-level (−90 dB) signals which were shown in Figs. B6 and B7. Without dither (Fig. B8), the fundamental, 1-kHz spike at the far left is joined by large spikes of harmonic distortion products at the right; the total harmonic distortion calculated from this display is 34%! With dither (Fig. B9), the noise has increased significantly, but the distortion (hardly visible, since it is now buried in the noise) has been reduced to a negligible 1% or less!

Though he is not certain that this final element of his three-part Digital Time Lens circuit is essential, Carver related the following story, which dates back to his early days in audio, to explain why he included the dither signal. "A long time ago, when I got my Revox A77 open-reel tape machine, I made a recording of Bruno Walter's rendition of Beethoven's Seventh Symphony. Of course, there was tape hiss (no Dolby NR), and so it sounded clean, but noisy. One evening I had a damp log burning in my fireplace and it was venting steam, making a hissing sound just like the tape recorder. Also, from time to time it would make a faint crackling sound.

"I happened to turn on my A77 and was utterly flabbergasted. Beethoven emerged from a silky, pure silence! I've never heard a tape sound better; the music was so clean, so pure, so uncontaminated by tape noise or record-surface ticks and pops. I wonder what would have happened if I had put an opaque screen in front of my fireplace so no one could see the fire.

"The powerful memory of that experience is why I've put the dither signal in my CD player. It makes me feel safer—and better."

Carver also told me that, while adding the dither may not do much at such low signal levels (the change in octave-to-octave balance and the adjustment of L + R/L − R ratio is much more significant), the dither signal does trade distortion for noise. But it's not an even trade—a little dither noise takes away a lot of distortion! *L.F.*

The Time Lens also adds dither, trading a small increase in noise for a large decrease in audible distortion.

channel. Of course, a simple voltmeter can't tell that the opposite-channel content is out of phase, so you get a poor separation *reading*. In fact, when you listen to music with the Digital Time Lens on, separation and depth of imaging actually *increase*—which is one of the objects of this circuit.

Figure 11 (using the phase-check test signals used in Fig. 10) is an interesting 'scope photo in that it shows exactly what I have just described: The left signal with some right mixed into it and the right signal with some left mixed in. Again, the waveforms *appear* to have a fair amount of crosstalk and, hence, poor separation. But careful study of the photo shows, in fact, that the "high-frequency" ripple on the low-frequency waveform is exactly 180° out of phase with the high-frequency signal on the opposite channel, while the low-frequency ripple seen "modulating" the envelope of the high-frequency signal is also 180° out of phase with the low-frequency signal of the alternate channel.

The Carver CD Player was able to track all but the last and widest section of the opaque wedge on my special defects disc. That is, it was able to overlook dropouts as wide as 800 microns. No problems were encountered in tracking the simulated dust spots, the greatest diameter of which was also 800 microns. Neither were there any mutes or skips when the laser pickup traversed the area of the disc that bore simulated fingerprint smudges. So, while The Carver did not do quite as well as some recent players that handled all of the defects on this test disc, it is not likely to give you any tracking problems unless you really mishandle your discs and cover them with scratches too wide for the player to correct. The player's resistance to external shock is very good, too.

Use and Listening Tests

In recent months I have tended to favor the sound of CD players that employ digital filtering, and The Carver CD Player is in this category. It almost goes without saying that the sound quality produced by this player was superb—without the Digital Time Lens. So, what did the Time Lens contribute? I look upon this circuit as an option, one that can and should be used with certain CDs which seem to lack the depth that I feel belongs in a musical performance. You might argue that the equalization afforded by the Time Lens (to provide what some have described as a warmer sound) could just as easily be accomplished by judicious use of bass and treble controls, but that is not true. Look at Fig. 2 and you will agree that no simple bass and treble controls can create this kind of a response curve. A graphic equalizer might, but not everyone has a graphic equalizer or the ability to set it to this empirically derived curve.

As for myself, I almost wish that Carver had chosen to separate the equalization function of the Digital Time Lens from the (L + R)/(L − R) ratio manipulation, since some of my discs seemed to profit from the latter effect but suffer from the change in overall response. I would hasten to add, however, that many of my earliest CDs benefited from both effects (and probably from the dither noise, too, though—like Carver—I can't swear that I could hear improvement from that particular addition).

The important thing about Carver's Digital Time Lens is that you have control over it. You can turn it off if you don't need it, and you can turn it on for those discs that seem to sound better with it. I don't think anyone can fault Carver for giving us this option, and in fact I commend him for the extensive research which must have gone into the development of his latest audio innovation.

Whatever else you do when you audition The Carver CD Player, be sure to listen carefully to the Digital Time Lens for several minutes before you turn it off. Try such a slow A/B test several times; it takes a bit of concentration to really appreciate what's happening. If, after all that, you don't like the feature, just turn it off. But I suspect that many owners of this CD player will use it selectively, putting little coded marks on their CDs that indicate whether they should be played with the Time Lens or not. I find nothing wrong with such an arrangement.

In emphasizing the Digital Time Lens feature, I don't want to overlook the basic CD player itself. It has a well-executed design which fits in nicely with Carver's growing list of fine products, and it is priced at a level that should make it affordable to a great many people who are ready for a good CD player.

Leonard Feldman

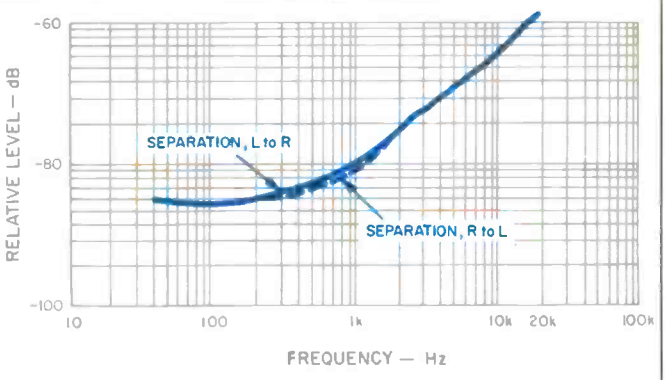


Fig. 10—Separation vs. frequency.

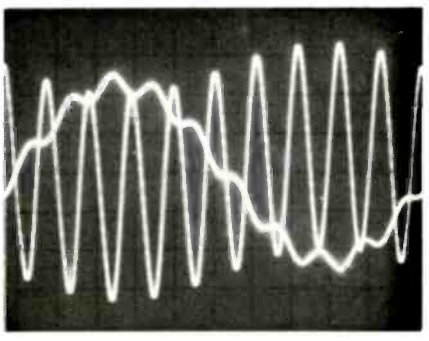
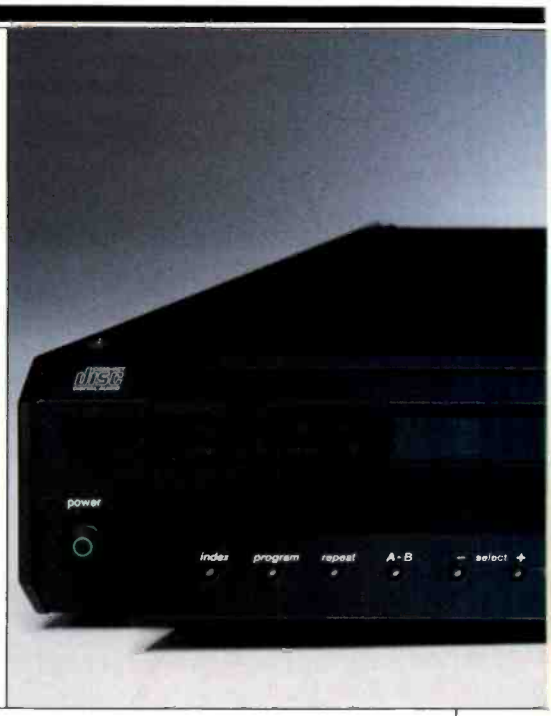


Fig. 11—Two-tone phase-test signal with Digital Time Lens on.

4

ADS CD3 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 20 Hz to 20 kHz, ±0.25 dB.
S/N Ratio: Greater than 100 dBA re: 0 dB.
THD: Less than 0.01%, 20 Hz to 20 kHz, at 0 dB; less than 0.1%, 20 Hz to 20 kHz, at −20 dB.
Channel Separation: Greater than 86 dB, 20 Hz to 20 kHz.
Phase Shift: Less than 5°, 20 Hz to 20 kHz, between or within channels.
Output Level: Fixed, 2.0 V rms at 0 dB, ±0.5 dB; variable, 0 to 2.0 V rms; headphone, 0 to 3.0 V rms into 30 ohms.
Dimensions: 17.5 in. (44.5 cm) W × 2.8 in. (7 cm) H × 14.8 in. (37.7 cm) D.
Weight: 17½ lbs. (7.9 kg).
Price: $895; optional RC1 remote-control unit, $99.
Company Address: One Progress Way, Wilmington, Mass. 01887.
(Originally published June 1985)



ADS obviously intends this, their first Compact Disc player, to be part of their highly regarded Atelier series of audio components. Not only is the styling of the CD3 consistent with that of the other components in that series, but its performance and features clearly identify it as a top-of-the-line product. As was pointed out to me by Richard Moore of ADS, the CD3 is the company's second fully digital product. Some of you may remember the ADS10 Acoustic Dimension Synthesizer, a digital time-delay unit which used A/D and D/A adaptive delta-modulation conversion techniques developed by DeltaLab. The CD3 is an international product, in the best sense of the phrase, with the developmental engineering work done on a cooperative basis by engineers from ADS and its sister firm, Braun Electronic GmbH, of West Germany, while a highly regarded Japanese company does the actual assembly work in that country.

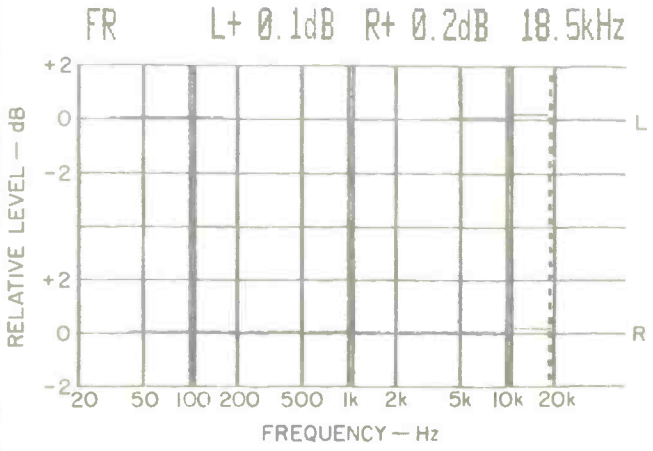
The CD3 can handle and play discs with up to 99 tracks, and as many as 30 selections can be programmed in random sequence. Using the optional remote control, any 30 of the 99 tracks can be programmed, with any selection accessible immediately; using the front panel controls, only the first 30 tracks are programmable.

The controls have been grouped in a most logical fashion, with the more often-used basic controls placed together on the front panel in full view. The more specialized and less often-used controls are on a push-to-release, pivoting panel below the disc drawer. These controls allow the more sophisticated user to perform such functions as toggling between display of elapsed and remaining time, toggling between track and index numbers, programming selections, and choosing any portion of the disc for repeat play.

I have often been asked what differentiates a really superior CD player from an "adequate" one. The ADS CD3 may help to answer the question, for it is definitely in the superior class, as evidenced by some of its mechanical innovations as well as by its electronic and sonic performance. The smoothly operating, motor-driven loading drawer, for example, cradles the CD on soft cushions to prevent any damage to the disc itself. The slider responds quickly, smoothly, and noiselessly. Like other ADS Atelier components, the CD3 uses steel top and bottom covers for mechanical strength and shielding. The spindle motor is an extremely quiet, d.c., brushless type.

I found the laser tracking-servo system to be quite resistant to external shock and vibration applied to the sides of

Fig. 1—Frequency response, left (top) and right channels.

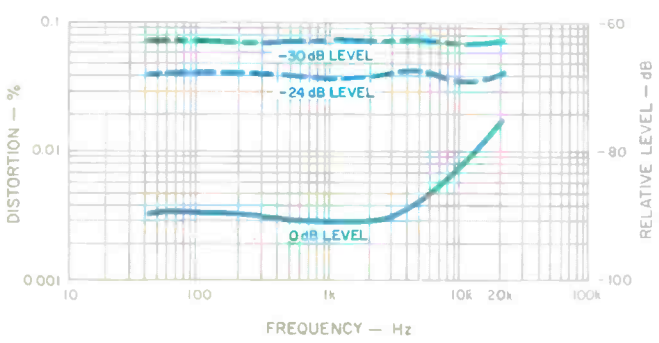


the unit. The sample I tested showed some sensitivity to mechanical shock applied vertically, but I am told by ADS that a cure is being worked out by shock-mounting the transport. In any case, vertical shock is the least likely type of mechanical vibration to occur in actual use.

Circuit Highlights

The CD3 employs two-times oversampling (88.2 kHz) with digital filtering. Separate digital-to-analog converters are used in each channel, with full 16-bit linear conversion. Hypersonic, multiple-pole, analog filters with cutoffs above 35 kHz are used for improved spurious-response rejection. These filters exhibit extremely flat frequency and phase response in the audio band and, according to ADS, have less than 5° of phase shift at 20 kHz. I found that the extremely quiet and low-distortion analog stages placed no dynamic-range limitations on this player.

Fig. 2—THD vs. frequency at three signal levels.



The CD3 employs advanced digital circuitry for tracking and control functions and for signal processing. This VLSI circuitry is under the control of two internal, eight-bit microcomputers which operate together for rapid control of tracking and error-correction circuits, and for rapid response to front-panel or remote-control command inputs.

Control Layout

The controls on the CD3 are, above all, designed to perform complex functions while remaining extremely simple to use. For example, pushing the power button, with a disc in place, will place the mechanism in the pause mode and give a readout of the total number of tracks on the disc and the total playing time. Loading of the disc drawer can be done by pressing the "Start" button or touching the "Slider" button. A "Pause" button functions as its name suggests, while the "Skip" button moves the pickup to the beginning of the next track if play is in progress. If "Skip" is depressed for longer than 0.5 S, the track or index number increases by one every half-second. Releasing the button advances the pickup to the track or index number shown at the time of release. Fast-forward and fast-reverse operate at three times normal speed when these buttons are first pressed, and at 20 times normal speed if the buttons are held down for more than 5 S. The return button sends the pickup back to its rest position and switches the disc-drive motor off.

The display area above the slider drawer incorporates a four-digit, seven-segment display for indicating elapsed or remaining time, and a two-digit, seven-segment display for showing the selected track or index number.

The only other features visible on the front panel are a headphone jack and pop-out headphone level control, both at the far right, and an indication of where to push on the

The CD3 is definitely in the superior class, as evidenced by some of its mechanical innovations as well as its electronic and sonic performance.

swing-down slider drawer to expose the programming and display controls. These handle elapsed- or remaining-time display, track or index selection and display, memory clear, and A-B play (automatic repeat between any user-selected start and end point). The CD3's rear panel has fixed and variable output jacks, with a level control for the latter.

The optional RC1 wireless remote control is designed to operate all ADS Atelier remote-controllable components, not just the CD3. It operates like a flip-up telephone/address selector, with seven overlays which show key designations for each of the components it can control. I did not have the remote-control unit on hand when I tested the CD3, but am told that the CD player will be the first ADS component controlled by this hand-held remote unit, with other components to follow.

Measurements

Frequency response, measured for both the left and right channels, was flat to within 0.2 dB from 20 Hz to 20 kHz (see Fig. 1). Output was extremely linear at all recorded levels, deviating from perfect linearity by no more than 0.2 dB over the range from maximum recorded level (0-dB reference level) to −80 dB.

Harmonic distortion at 0-dB recorded level was about as low as I have measured for any CD player: 0.003% at mid-frequencies and no more than 0.18% at 19 and 20 kHz, where many earlier generation CD players exhibited much higher distortion. SMPTE-IM distortion measurements were also extremely low, with readings no higher than 0.002% at maximum recorded levels. Twin-tone IM measurements resulted in readings of 0.0025% at 0-dB level and 0.008% at −10 dB. Figure 2 shows harmonic distortion as a function of frequency for test signals at three recorded levels. As with all digital audio systems, harmonic distortion increased linearly as signal level decreased, reaching about 0.075% at −30 dB. As for undesired "beats" within or without the audio spectrum, they were practically nonexistent in this unit—a direct result of the oversampling, digital filtering and full 16-bit linear D/A conversion techniques used in the CD3.

Signal-to-noise ratios for the CD3 were outstandingly high, measuring more than 98 dB, unweighted, and between 102 and 104 dB, A-weighted. The spectral distribution of residual noise is shown in the S/N analysis graphs of Figs. 3A and 3B.

At low and mid-frequencies, separation (Fig. 4) ranged from just over 83 to 84 dB. At higher frequencies, separation decreased slightly—more so in R to L than L to R. At 20 kHz, separation in both channels was still 74 dB, far more than is required for a very satisfactory stereo presentation. Output from the fixed-level jacks measured 2.04 V, while maximum level from the variable outputs was 3.24 V.

Figure 5 shows the CD3's reproduction of a 1-kHz, square-wave signal. The shape of the square wave confirms the fact that this player employs the now-preferred digital-filter approach. The very low level of ripple observed on the top and bottom of the waveform is not so much the result of phase shift (virtually none in this unit) as it is the absence of higher order odd harmonics (above 20 kHz) which are not present in the reproduced square wave. The digitally generated unit-pulse signal on my Philips test disc was repro-

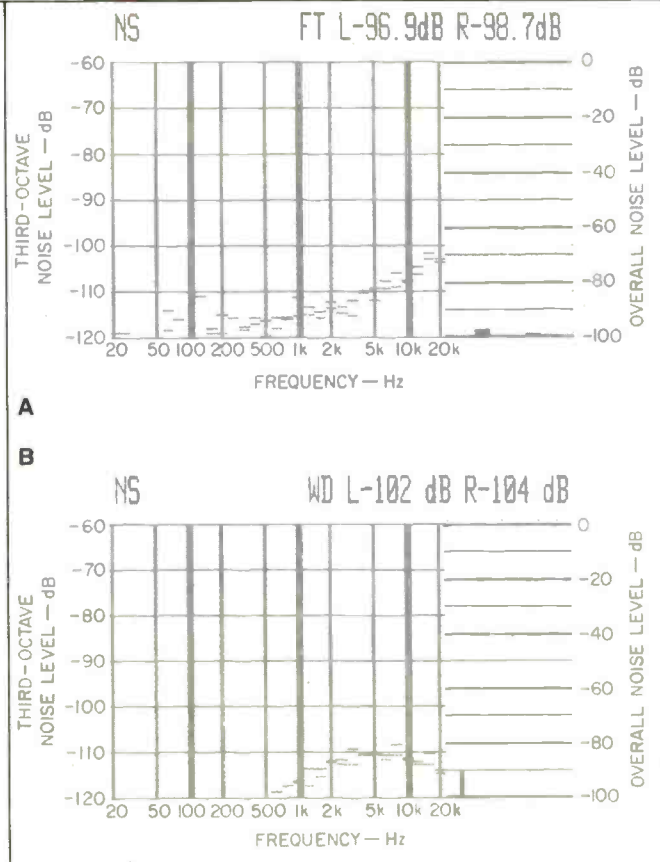


Fig. 3—S/N analysis, both unweighted (A) and A-weighted (B).

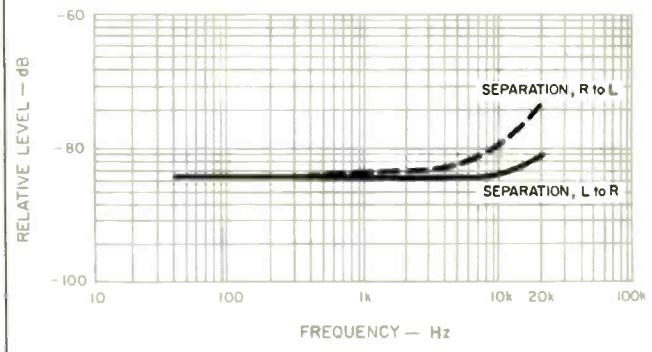


Fig. 4—Separation vs. frequency.

More and more CD players, including this one, zip right through my defects disc without missing a beat. I'll have to find a more severe test!

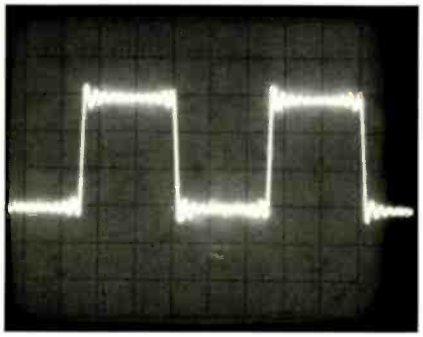


Fig. 5—Square-wave reproduction, 1 kHz.

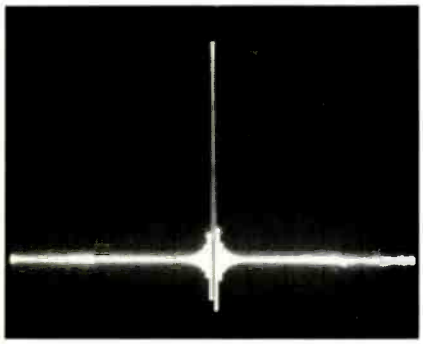


Fig. 6—Single-pulse test.

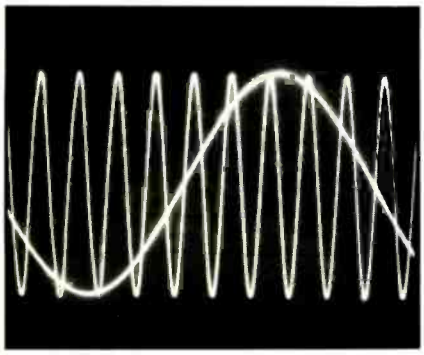


Fig. 7—Phase-error check using tones of 200 Hz and 2 kHz.

duced with the waveshape shown in Fig. 6; again, a result that is typical of CD players which employ this advanced type of digital filtering and oversampling.

While I lack the means to check out ADS's claim of minimal phase shift between channels or within a channel, the 'scope photo of Fig. 7 does show that there was no measurable phase shift between a 200-Hz signal recorded on the left channel and a 2-kHz signal output from the right. The simultaneous zero-axis crossing in the positive direction of both signals confirms this.

More than two years ago, when I subjected the earliest CD players to my special "defects" test disc (a disc with an increasingly wide opaque wedge, a series of black dots meant to simulate dust particles, and a simulated fingerprint smudge), it was a rare event when a player's optical tracking system and error-correction system could play through these imperfections without mistracking or muting. Now, more and more current-generation players, including the ADS CD3, zip right through this problem disc without missing a beat. The maximum width of the opaque wedge on the test disc is 900 microns. ADS tells me that their CD3 could easily handle a width as great as 1.5 mm (1,500 microns). It looks as though I am going to have to come up with a more severe tracking test for CD players! Lateral vibration and shock of more than mild severity also resulted in no mistracking, but, as mentioned earlier, downward (vertical) external shock on the top surface of the unit did result in momentary muting and, in extreme cases, mistracking.

Use and Listening Tests

The ADS CD3 ranks among the best-sounding CD players I have tested thus far; it reproduces well-engineered CDs with smoothness and clarity. I was particularly impressed with its sound quality during very soft musical passages, where earlier CD players have sometimes been less than outstanding.

Ergonomically, the ADS CD3 is a gem. At the time I tested the unit, the owner's manual was not yet available, yet I had no trouble figuring out what the controls did and how they were to be used. If you do most of your listening to CDs from start to finish, or want to select tracks of a disc as you listen (skipping those you don't want to hear all the way through), you may not even have to refer to the owner's manual. The display area includes a transparent window which, with its rear illumination and mirror optics, allows you to watch a CD spin while it plays. I find this not only desirable but comforting, since it assures me that all is well inside the drawer and that my favorite CDs have not been swallowed up.

If there is one aspect of the ADS CD3 that bothered me just a little, it was the fact that the remote control is not included as part of the standard package. I understand that this particular remote is intended to be used with several ADS Atelier components, and therefore it is probably a costlier item to produce. Still, adding an extra $100 to what is already a fairly expensive CD player may discourage some people from considering this particular CD player. On the other hand, given an opportunity to audition this player and operate its elegant controls, others may well feel that price is of secondary importance when such a magnificently crafted instrument is involved. *Leonard Feldman*

5

NAKAMICHI OMS-7 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 5 Hz to 20 kHz, ±0.5 dB.
THD: 0.003% at 1 kHz.
S/N Ratio: Greater than 92 dB (IHF A-weighted).
Channel Separation: Greater than 92 dB.
Number of Programmable Selections: 24.
Output Level: 2.0 V.
Phone Output Level: 20 mW into 8 ohms.
Power Consumption: 33 watts.
Dimensions: 17⅛ in. W × 3-15/16 in. H × 12⅛ in. D (43.5 cm × 10 cm × 30.8 cm).
Weight: 16 lbs., 9 oz. (7.5 kg).
Price: $1,295.

Company Address: 19701 South Vermont Ave., Torrance, Cal. 90502.
(Originally published August 1985)

Nakamichi takes a cautious stand when it comes to new technology and new products. Best known for its pioneering work in cassette deck design and manufacture, the company now is entering broader fields of electronic endeavor, including such high-tech ventures as the production of a research instrument that can, among other things, record and play back music in CD format, on appropriate discs. This first optical memory system, capable of recording and reproducing a wide variety of optical recording media, is being made available strictly for laboratory research purposes—at a cost of $85,000!

I mention this research instrument simply to point out that Nakamichi does not introduce a new product category casually. They waited a long time to introduce their first CD player, hoping to benefit from the lessons learned by others whose first- and even second-generation CD players left something to be desired in terms of sonic and mechanical performance. As the Nakamichi people explain it in one of their well-written "white papers," they saw three major problems with most first-generation players. The first of these was the players' steep analog brick-wall filters and their attendant phase shift. The second flaw Nakamichi perceived was the use of time-sharing D/A conversion circuitry which introduces a small, but measurable, interchannel phase error. The third problem in early players, says Nakamichi, was poorly conceived drive systems, which had servos that were shock-sensitive and created an excessive error rate or even actual mistracking.

Nakamichi claims to have overcome all of these problems in their OMS-7 and in the less-expensive OMS-5. Digital filtering prior to D/A conversion, plus oversampling at a 176.4-kHz rate (four times the basic sampling rate of 44.1 kHz), allows them to use analog output filters which have a much gentler slope and which provide linear-phase filtration and constant group delay.

The OMS-7 also separates the channels prior to conversion—while they are in digital form—and then uses independent left and right D/A converters to overcome the interchannel phase-angle discrepancy noted earlier. Finally, the OMS-7 drive mechanism is mounted on a zinc-alloy diecasting suspended on coil springs, which floats free of the disc-

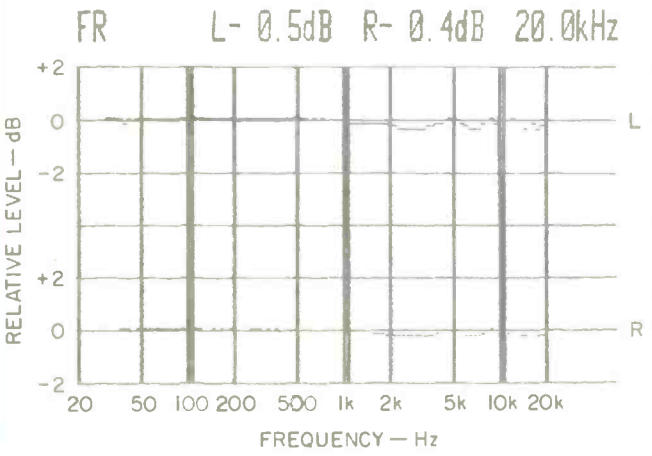


Fig. 1—Frequency response, left (top) and right channels.

loading mechanism and main chassis. A tapered, aluminum spindle centers the disc to reduce track eccentricity and error rate.

Control Layout

The OMS-7's power switch, phone level control, and phone jack are located near the left edge of the front panel. To their right is the disc drawer with its "Eject/Load" button. A display area to the right of the drawer provides detailed status information including track number being played, elapsed time (for each track), remaining time, tracks to be played, and index number. Additional indicators light up to

Sonically and mechanically, I can't fault the OMS-7 in any way, though its measured specs were not quite as good as those of others I have tested.

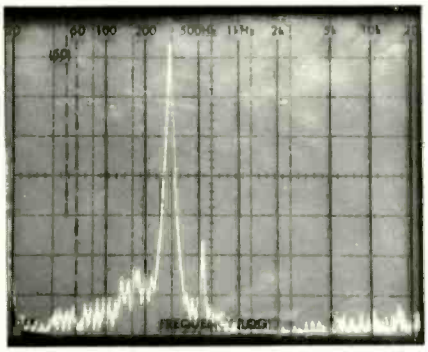


Fig. 2—Spectrum analysis from 0 Hz to 50 kHz shows 10-kHz test signal (large spike) and inaudible beat tone at approximately 24.1 kHz (small spike).

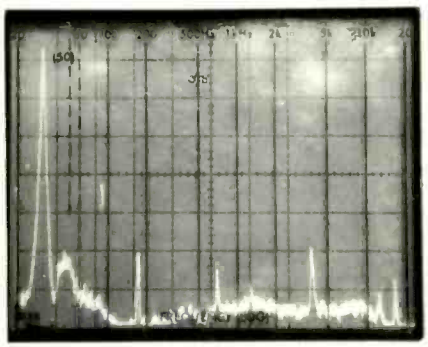


Fig. 3—Spectrum analysis from 10 to 100 kHz shows spurious products at the fundamental sampling frequency and at multiples of that frequency.

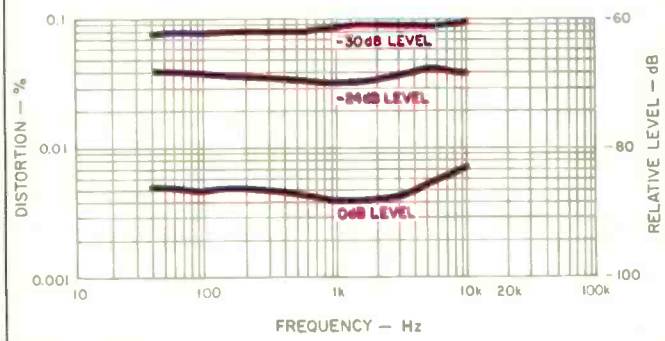


Fig. 4—THD vs. frequency, using low-pass filter, at three signal levels.

show that tracks or index numbers have been stored in the programming memory, that a disc has been loaded into the player, that the player is in standby mode (during track search or while the laser pickup is searching for the beginning of the first track), and when repeat playback has been selected.

Operating controls to the right of the display area have been very logically arranged. A large "Play" bar is at the top; below it are two smaller pushbuttons for "Stop" and "Pause." Below these are four still smaller buttons, two of which are used to skip forward or backward track by track, and two of which permit fast-forward or fast-reverse with audible cueing.

Ten numbered keys near the right end of the panel select track and/or index numbers. Below these are "Memory" and "Clear" buttons, plus four more pushbuttons to call up memory contents on the display, to control index search operations, to initiate repeat play, and to check remaining time and remaining number of tracks on a disc.

A wireless, hand-held remote-control module duplicates the main control functions of the player but does not have facilities for remote-controlled random-access programming; this can only be done via the front-panel numeric keys. In addition to the usual left- and right-channel outputs on the rear panel of the OMS-7, there is a multiple-pin socket which is identified as a "System Remote Terminal." This extra terminal, the owner's manual tells us, will serve for total system remote control when using the OMS-7 CD player with audio components to be introduced by Nakamichi in the future.

Measurements

Test-instrument measurements don't always correlate with listening tests, and the Nakamichi OMS-7 is a case in point if ever there was one. Not that the bench measurements were particularly bad—as with almost all CD players, my measured results were exemplary compared to those I get for analog components such as amplifiers and tuners. It's just that they were not quite as superb as the measurements I have gotten recently from other CD players. Yet, sonically as well as mechanically, I could not fault the Nakamichi in any way. In fact, its sound quality and resistance to shock were as good as any I have tested. The only quality which was marginally poorer than that of some top-of-the-line players I have tested was its tracking/error-correction capability, which I'll discuss a bit later.

Frequency response, shown in Fig. 1, was flat to within the claimed ±0.5 dB over the entire audio range. A small amount of ripple in the response curve can be seen, however, at the upper frequencies; it amounts to no more than about 0.3 dB. (Bear in mind that the vertical scale in Fig. 1 is 2 dB per major division.)

My first problem during the test-measurement phase of this evaluation had to do with harmonic distortion. When I tried to measure this parameter using a single-reading distortion analyzer, I was taken aback by the readings I obtained. When I introduced a low-pass filter (with a cutoff at around 20 kHz), I quickly realized that the supposed "distortion" wasn't harmonic at all, but consisted of ultrasonic "beats" well outside the audio range. These are shown in

The player had trouble with the widest portion of my test disc's opaque wedge, but not with its simulated dust spot or fingerprint.

the spectrum analysis photos of Figs. 2 and 3. In Fig. 2, the sweep extends from 0 Hz to 50 kHz. The large spike is the desired 20-kHz output, while the lower amplitude spike is a beat occurring at around 24.1 kHz. Using an even wider frequency sweep (from 10 to 100 kHz) in Fig. 3 reveals additional beats at the fundamental sampling frequency and at multiples of that frequency. I would have thought that, with the digital filtering and oversampling techniques used in this player, such beats would not be present. They did not introduce any intermodulation or spurious products *within* the audio range; it just seems odd that they are there. I am wondering if they are the result of the presence of multiple "timing clocks" which govern the oversampling rate in various integrated circuits within the player's D/A circuitry.

When I introduced a low-pass filter into the THD measurement chain, the actual THD readings within the audio band were, of course, more like the value claimed by Nakamichi, as shown in Fig. 4. Unweighted signal-to-noise ratio measured a very good 95.7 dB, and the A-weighted measurement was an even better 100.0 dB (see Figs. 5A and 5B). SMPTE-IM distortion measured 0.01% at maximum recorded level, increasing to 0.1% at −20 dB recorded level. CCIR IM (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) measured a very low 0.0037%. Stereo separation, plotted as a function of frequency in Fig. 6, ranged from 76.2 dB at the high frequency extremes to 87.2 dB at mid-frequencies.

Reproduction of a 1-kHz square wave by this player is shown in Fig. 7. As has been true of other CD players employing digital filters and oversampling, the waveform exhibits no ringing, only a slight ripple along its top and bottom edges. This denotes the absence of higher order harmonics above the 20-kHz audio bandwidth. The appearance of the unit pulse in Fig. 8, as reproduced from my Philips test disc, further confirms the use of digital filtering and oversampling in this player's D/A circuitry.

The OMS-7 fell just short of being able to play through the widest section of the opaque wedge on my special "defects" test disc. During play I heard occasional ticks, indicating that the player was unable to correct or conceal over that 900-micron width of missing data. On the other hand, the player had no trouble playing through the widest simulated dust particle on the test disc, a black dot 800 microns in diameter. Neither did it misbehave at any time while playing through the test disc's simulated, semi-opaque fingerprint smudge.

Use and Listening Tests

The Nakamichi OMS-7 exhibits the kind of smooth, natural sound I have come to expect from CD players employing the advanced digital filtering and oversampling techniques which now are gaining favor with most CD hardware manufacturers. Gone is the unstable stereo imaging of some of the earlier players, as well as what some astute listeners sensed as a somewhat grainy high end. I want to stress that the kinds of audible differences I am talking about here are certainly not great. The casual listener will hear little if any difference between first-, second- and third-generation CD players. They all sound much better, overall, than other program sources. But to an experienced and critical listen-

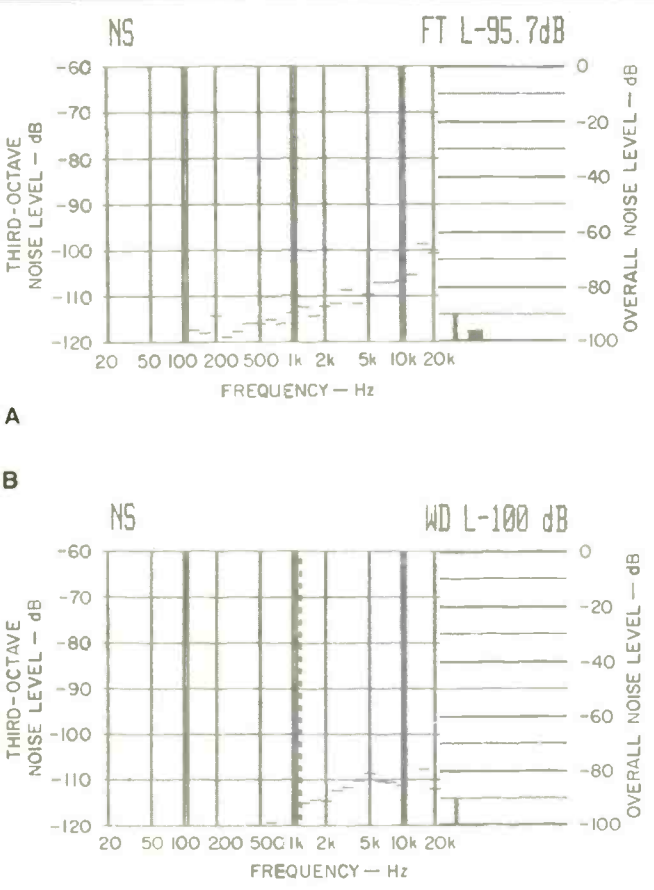


Fig. 5—S/N analysis, both unweighted (A) and A-weighted (B).

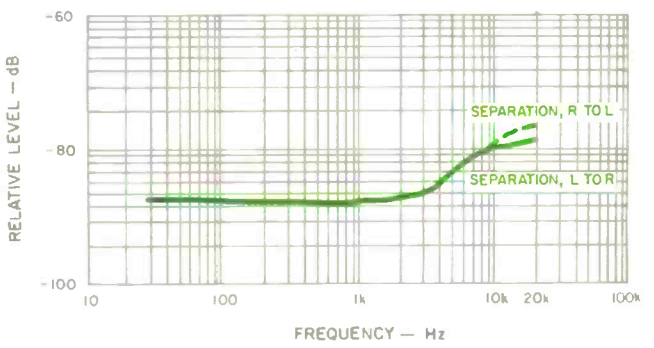


Fig. 6—Separation vs. frequency.

To an experienced and critical listener, the improvement in sound of this and other recent players will be apparent and very worthwhile.

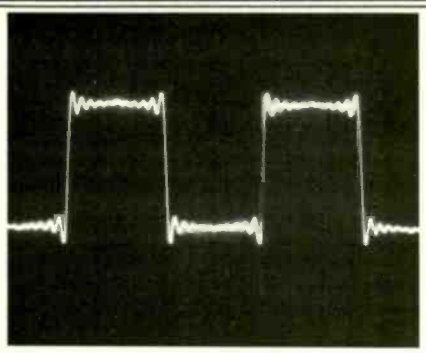


Fig. 7—Square-wave reproduction, 1 kHz.

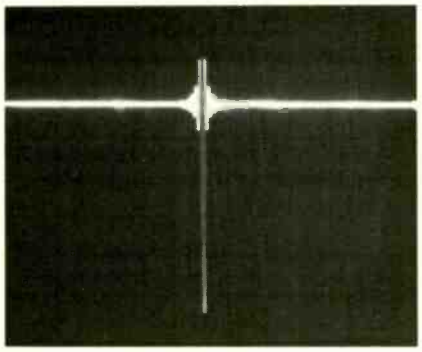


Fig. 8—Single-pulse test.

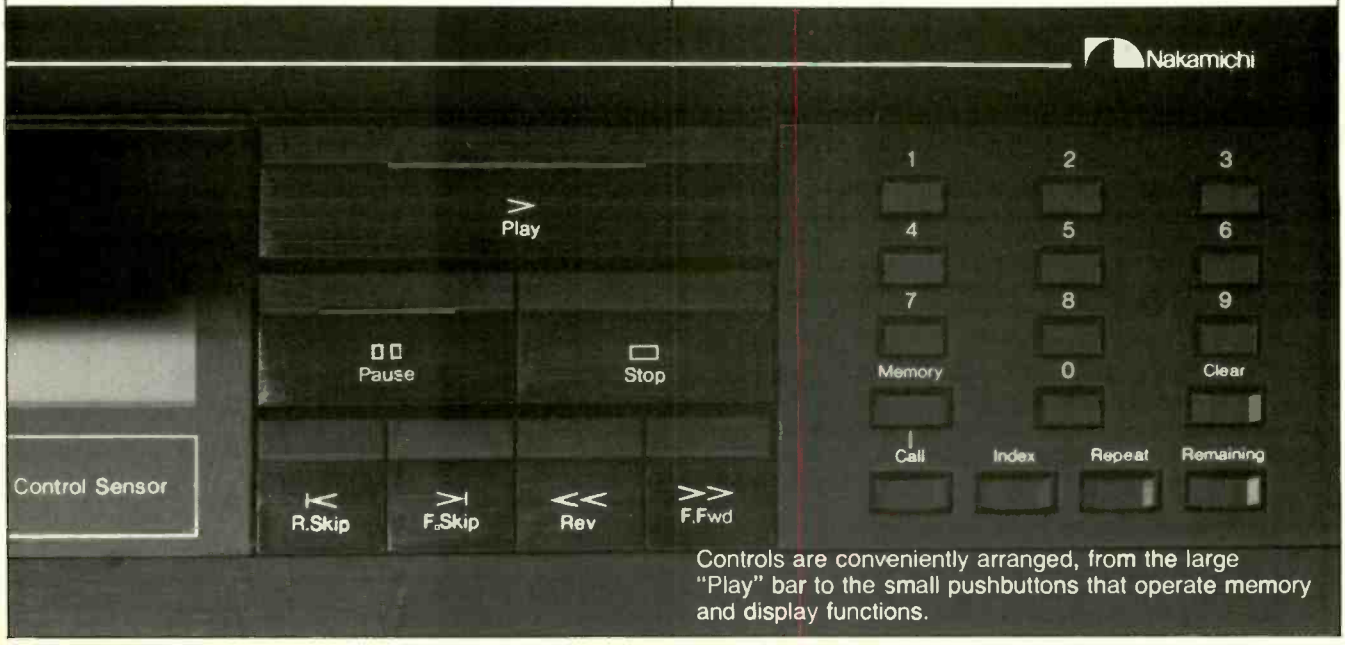
er, the sonic improvement of this and other recently introduced players is apparent and very worthwhile.

From a purely scientific point of view, I am somewhat troubled by those ultrasonic signal components I detected during the bench tests—but as a listener, I must report that these out-of-band components in no way degraded the musicality of reproduced sound from my favorite CDs. In that connection, if you are a lover of classical recordings, try any of the six discs from Denon which make up a complete set of Beethoven's nine symphonies, performed by the Staatskapelle Berlin Orchestra under the direction of Otmar Suitner. Or, for some real dynamics and musical fun, listen to Telarc's *Ein Straussfest*—a collection of waltzes, polkas and marches of the prolific Strauss family, replete with popping champagne corks, pistol shots, aerial bombs and thunderclaps. If you play this Telarc disc when checking out the OMS-7 or any other CD player, be sure to observe the warning in the album notes about starting out at lower levels for initial playback until a safe level can be determined for the rest of your audio equipment!

Programming the OMS-7 was easy to do and was almost self-explanatory from looking at the front panel. Being able to move the pickup to a specified index point was also a welcome feature, particularly since more and more classical discs are being divided into indexed portions as well as track numbers. In terms of convenience features, it might have been nice if the remote-control unit supplied with the OMS-7 had been able to program selections into memory, considering the player's relatively high price. However, the functions that *can* be performed remotely all worked perfectly, even at distances greater than those specified in the owner's manual.

Nakamichi did not rush into the CD marketplace with just any series of players. The OMS-7 clearly demonstrates the wisdom of the company in waiting until they could do it right.

Leonard Feldman



Controls are conveniently arranged, from the large "Play" bar to the small pushbuttons that operate memory and display functions.

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6

SONY CDP-650ESD COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 2 Hz to 20 kHz, ±0.3 dB.
Harmonic Distortion: 0.0025% at 1 kHz.
Dynamic Range: Greater than 96 dB.
Channel Separation: Greater than 95 dB.
Number of Programmable Selections: 20.
Output Level: 2.0 V, fixed and variable.
Phone Output Level: 28 mW into 32 ohms.
Power Consumption: 16 watts.
Dimensions: 16-15/16 in. W × 3⅛ in. H × 13-3/16 in. D (43 cm × 8 cm × 33.5 cm).
Weight: 19 lbs., 6 oz. (8.8 kg).

Price: $1,300.
Company Address: Sony Dr., Park Ridge, N.J. 07656.
(Originally published July 1985)

Digital Compact Disc technology is moving along at a rapid clip. Sony, one of the "founding fathers" of CD, measures its progress by, among other things, the generation number of its players. The CDP-650ESD is Sony's third-generation, top-of-the-line player; as such, it incorporates a host of technical advances, both internally and externally, which are worth mentioning at the outset.

Most important, perhaps, is the fact that Sony has, at long last, swung over to digital filtering and oversampling—a technique first espoused by Philips, their partner in the development of the CD system. Moreover, Sony's use of oversampling and digital filtering goes a step further than anyone else's in that it employs a single master clock to synchronize all decoding and digital-to-analog conversion operations. The very significant benefits of this technology became apparent to me when I tested the unit and listened to it, but more about that later.

Much of the advanced circuit integration developed by Sony for their miniaturized car CD players and their acclaimed Model D-5 portable CD player is also found in the CDP-650ESD, including the incredibly dense VLSI chip that replaces the function of three ICs used in earlier-generation players. The tracking, servo and laser pickup mechanism is the same lightweight, lower-mass assembly used in the aforementioned D-5 and car players; the motor which guides the laser pickup and keeps it on track is a brand-new, linear unit which replaces the bulky, worm-gear motor used on earlier models. This new motor enables the player to access any point on a CD in 1 S or less—even track 99 of a 99-track disc, if any such were ever produced (besides test discs)!

Random-access programmability has been increased to 20 selections, including programmed access to index points on those discs which are index-configured. (More and more such discs are appearing lately.) In addition to specific, programmed play, Sony has incorporated a new playing mode which they call "Shuffle Play." In this mode, the selected tracks or index segments are played back in random order. I wondered what possible use this might be to consumers; when I inquired, I was told that it might be handy to have when playing a multi-track disc for background music or for dancing. The disc could be repeated over and over, but the order of selections would be different each time so that listeners wouldn't become bored. I rather think that this function won't be used by too many people, but if nothing else, it does display the power of the microprocessor used in this machine. Another novel convenience is the "Auto Delay" function, which allows you to delay the playback of each chosen selection by 2 S. Repeat play and AMS (Automatic Music Sensor, for rapid selection of a given track) are pretty much the same as they were on earlier Sony players.

Control Layout

The front panel of the CDP-650ESD has a completely new look, especially in the display area. The disc-compartment drawer remains basically as it was on earlier machines. The compartment drawer is opened by touching an "Open/Close" key just to its right, and is closed by touching the front of the drawer itself, by touching the "Open/Close" key or by initiating "Play" of a disc. Numbered keys from 0 through 20, plus a key labelled "+10," are located near the panel's center and are used to call up desired tracks either for immediate play or for programming. With the aid of the "+10" key, it becomes easy to call up or program track numbers higher than 20; for example, to call up track 44 (assuming there were that many tracks on a disc) you would punch the "+10" button four times and then touch the "4" button. The "Play," "Pause," "AMS" (automatic track advance and track retard), and play-mode keys ("Continue," "Single," and "Program") are to the right of the numeric keyboard, while "Check" and "Clear" keys (for verifying programmed instructions or clearing them from memory) are just below the numeric keys. The "Stop" key and a pair of manual-search keys are near the lower right corner of the panel; the latter allow fast search in either direction while listening to a disc.

At the lower left corner are the switches to turn the player on and off, either manually or by an optional external timer. Five more buttons are beneath the display: "Repeat" (which

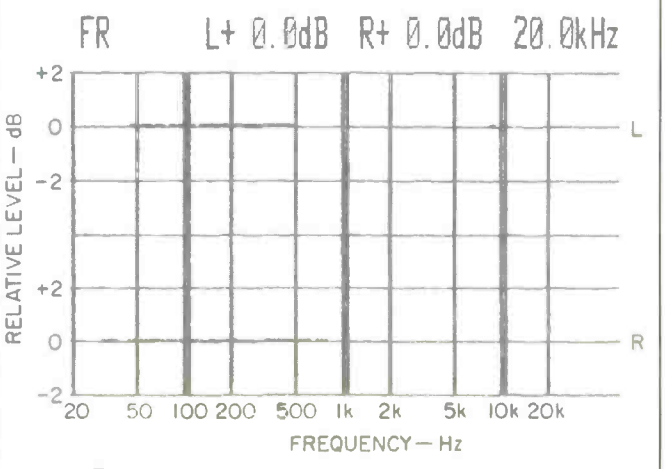


Fig. 1—Frequency response, left (top) and right channels.

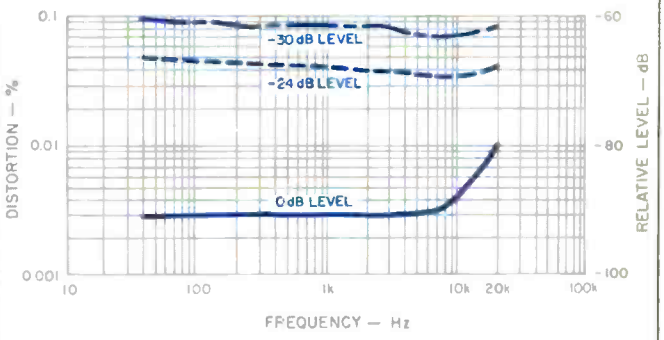


Fig. 2—THD vs. frequency at three signal levels.

Sony has, at last, gone to digital filtering and oversampling, using a single master clock to synchronize all D/A conversion operations.

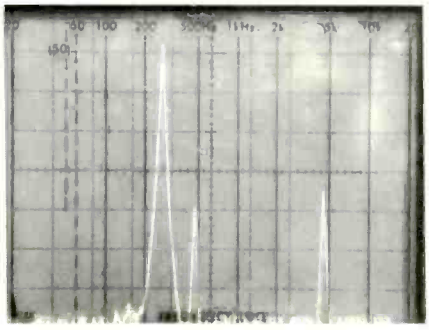


Fig. 3—Spectrum analysis done on early CD player, showing desired tone (tall spike) and spurious beat tones.

repeats a selection program or the passage between two user-selected points), "A↔B" (which sets those points in memory), "Time" (to select elapsed- or remaining-time display), "Auto Delay," and "Shuffle Play." At the lower right corner are an output-level control (which varies both headphone output level and the level at the rear-panel variable output jacks) and a stereo phone jack.

The display area on the front panel provides a variety of useful data concerning the status of the player and the disc being played. A "Disc" indicator lights up when a disc has been inserted properly. When a disc is first inserted, a "Track" indicator shows the total number of tracks contained on the disc for a few seconds, then displays the

SONY'S DAS-702ES: GILDING THE DIGITAL LILY?

Along with the remarkable Sony CDP-650ESD Compact Disc player tested for the accompanying report, I also evaluated another new product from Sony, the DAS-702ES external D/A converter. In essence, this unit duplicates functions which must be incorporated into any CD player, the translation of the digital code extracted from a digital program source (such as a Compact Disc) into the closest possible replica of the original analog audio signal. In fact, it's only usable with signal sources having digital outputs, like the CDP-650ESD, but no other CD players that I know of so far. Thus, my first reaction to this additional component was to ask why anyone would want or need it, since full decoding is performed by the D/A circuitry already contained in every CD player (including the Sony CDP-650ESD, which is intended to serve as a companion piece for the DAS-702ES).

The people at Sony suggested that this separate D/A decoder (or converter) is a state-of-the-art device which, if connected to the CDP-650ESD, would yield sound superior even to that of the top-of-the-line CD player itself. Furthermore, I learned that the DAS-702ES offers greater digital-to-analog decoding flexibility and might well be needed in the future for certain other D/A decoding chores. For example, the digital input applied to this decoder need not be confined to a sampling rate of 44.1 kHz (the standard CD sampling frequency). The unit can also handle a sampling rate of 32 kHz (the standard sampling rate for digital-audio broadcasting in Europe and elsewhere) and the 48 kHz used in professional digital recording with equal ease.

I was curious to learn whether I would be able to measure or hear any difference between the sounds produced by the superb CDP-650ESD operating on its own, and the sounds produced by hooking up that player (via its digital-output jack) to the DAS-702ES. To satisfy my curiosity, I repeated virtually every measurement that I had made on the CDP-650ESD alone, on the combination of the CD player plus the separate D/A unit. I resolved to do a blind listening test between the two setups as well, using my associate to set up the test in a random switching sequence and instructing him not to tell me when he was switching setups from one to the other. But I'm getting a bit ahead of myself.

On the DAS-702ES, the digital input jacks are paralleled by a pair of jacks identified as "Digital Outputs." These provide a convenient feedthrough to pass the undecoded digital program material to other devices which might require data in digital format (such as, for example, some future type of dedicated, digital tape-recording mechanism, or even the

The brand-new, linear pickup motor enables the player to access any point on a CD in 1 S or less.

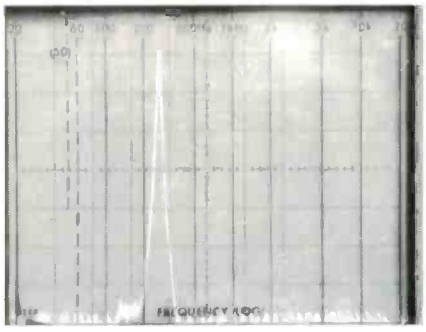


Fig. 4— Same test as in Fig. 3, done on the Sony CDP-650ESD. Note absence of unwanted beat frequencies above the residual noise floor.

number of the track actually being played. A time counter displays the total amount of playing time on a disc when the disc is first inserted, after which it reverts to displaying the elapsed time of the track being played or the total time remaining on the disc. A "PGM" (ProGraM) indicator illuminates when the player is in the standby mode for programming. An "Index" indicator shows the index number of the selection being played (or, during the "check" sequence, of index numbers programmed for future play). Lights on a 1 to 20 numeric grid show how many selections you've programmed. If you program more than 20, the word "Over" lights up, along with the grid.

The rear panel of the CDP-650ESD is equipped with fixed-

black box that will someday be used to generate the video graphics signals encoded in certain CDs).

The only front-panel controls on the DAS-702ES are a power "On/Off" switch, a "Digital Input" switch (for selecting between the two sets of digital input signals which may be connected to the unit), a headphone jack for monitoring decoded output using stereo phones, and an output-level control which regulates both headphone and variable line-output levels. The rear panel is equipped with the aforementioned pairs of digital input and output jacks, as well as pairs of fixed- and variable-level analog (decoded) output jacks.

Measurements

Many of the published specifications supplied for the DAS-702ES, though excellent in their own right, are actually somewhat poorer than the specs supplied by Sony for the CDP-650ESD operating by itself! For example, frequency response claimed for the separate decoder/converter, though extending from 5 Hz to 20 kHz, carries a tolerance of ±0.5 dB, as opposed to ±0.3 dB and a range of 2 Hz to 20 kHz for the player. Rated distortion for a 1-kHz signal at maximum recorded level (using a 44.1-kHz sampling rate) is listed as 0.004%, as opposed to 0.0025% for the CDP-650ESD. Dynamic range is marginally lower than that of the player alone, as well. And so on.

Sony maintains that when you get down to the published specs that are involved in the digital domain, such minute differences are not what determine which unit will sound better. I certainly couldn't take issue with that, but I did want to make some measurement comparisons for my own satisfaction.

In Fig. B1 you will find a graph of frequency response plotted in the same way as Fig. 1 of the CDP-650ESD report. Note that at 18.5 kHz there is already some attenuation of response. Figure B2, plotting distortion versus frequency, confirms what Sony admits: The separate D/A converter actually has slightly higher distortion at the three output levels I use to measure THD. Signal-to-noise ratio

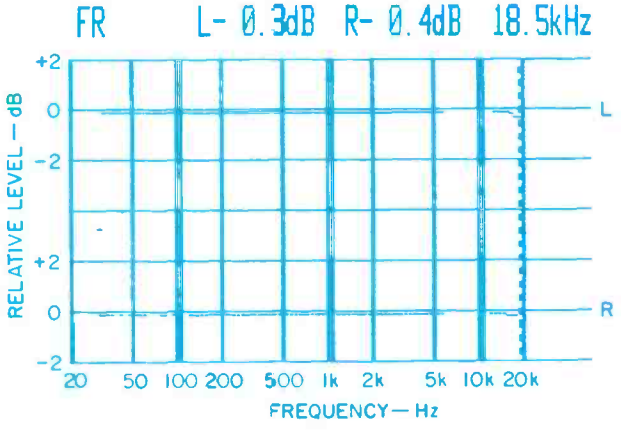


Fig. B1— Frequency response, left (top) and right channels, DAS-702ES D/A converter.

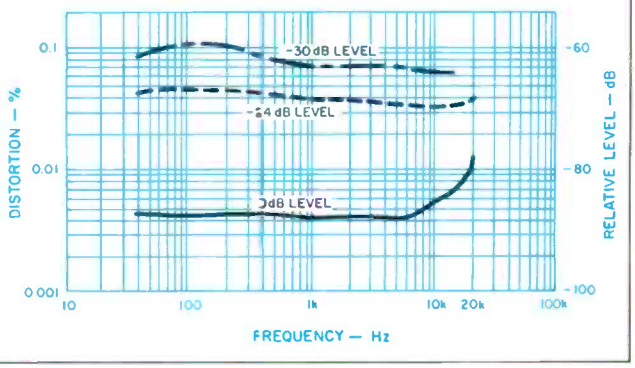


Fig. B2— THD vs. frequency at three signal levels, DAS-702ES.

The CDP-650ESD exhibited the flattest frequency response of any player I've ever tested. Deviation from absolutely flat never exceeded 0.1 dB.

and variable-level output jacks. There is also a multiple-pin accessory connector which, the owner's manual cryptically tells us, is to be used "to connect optional equipment which will be available in the future." By this time, I suspect, many of us know that the "optional equipment" will be a black-box accessory which will allow access to the video graphics that will soon be available on Compact Discs. The addition of this accessory will allow such digitally generated graphics to be displayed on your TV screen while you listen to the audio content of the same CD.

The rear panel also has a "Play Mode" initializing switch. This switch sets the turn-on play mode, determining whether the CDP-650ESD will set itself for continuous, single-selection, or programmed play when first turned on. The rear-panel switch would therefore be set to the mode you want most often, while the front-panel mode keys are used to

(unweighted, at least) was also a bit poorer on the DAS-702ES, 94.9 dB as against 97 dB for the CDP-650ESD (see Fig. B3). About the only parameter that measured better with this decoder than with the CDP-650ESD alone was separation, which, at mid-frequencies, reached levels as high as 86 dB and remained higher than 82 dB at 20 kHz.

Using the same test disc, I photographed the usual square-wave, unit-pulse and phase-shift signals as they appear on an oscilloscope in order to compare them with the photos obtained for the CDP-650ESD unit. Try as I might, I couldn't see the slightest bit of difference between Figs. B5, B6, and B7 and the corresponding photos taken for the CD player alone. Can you?

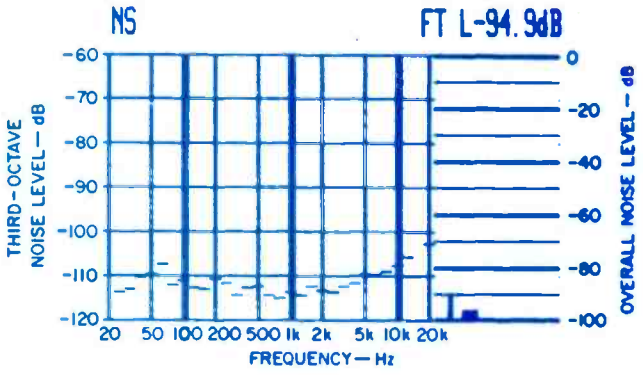


Fig. B3—S/N analysis, unweighted, DAS-702ES.

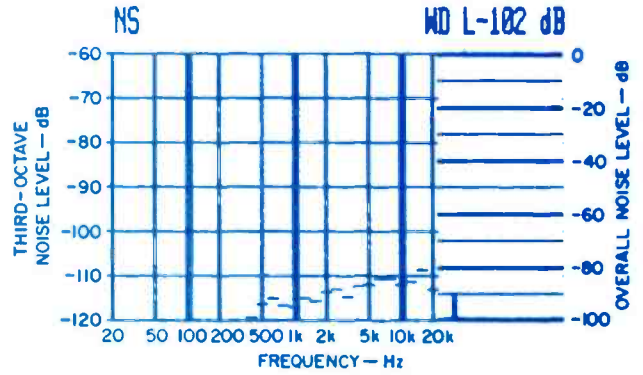


Fig. B4—S/N analysis, A-weighted, DAS-702ES.

Listening Tests

Next, I was ready for the "moment of truth." Dutifully blindfolded, I asked my assistant to play some of my favorite CD tracks through both setups: The CDP-650ESD outputs feeding my reference system directly, and the player's digital output hooked up to the DAS-702ES, whose analog outputs were, in turn, hooked up to another pair of inputs on the reference amplification system. Happily, there was no problem adjusting for precisely equal outputs; when you deal with Compact Disc players, output levels are easily controlled and referenced to maximum recorded level. In this case, maximum recorded level provided an output of exactly 2.0 V rms for both setups.

After extensive listening, I have to tell you that I could not, at any time, distinguish between the sound of the two systems. They were both marvelous, of course, but until I have a need for a decoder that will handle digital information using a sampling rate of either 32 or 48 kHz, I myself see no reason to invest in this separate decoder, however more sophisticated its circuitry may be.

Dealing in this rather controversial area of esoterica (which is not my usual habitat, I might add), I don't want to let the matter stand there. I have a feeling that I am going to be deluged by a sack of mail from readers who will tell me that *of course* they can hear an obvious improvement when the separate (and costly) D/A converter box is used to do the digital-to-analog decoding. In order to forestall such a deluge of mail, I'm going to strongly urge Editor Eugene Pitts to allow other ears to conduct similar testing. If those ears disagree with my conclusion, I will not be upset or the least bit insulted. I will, in fact, conclude that perhaps Sony had very good reasons after all for introducing, as a consumer product, a component part of a Compact Disc player which

This feature-laden player has just about every convenience I would want. They're easy to use and are augmented by the wireless remote control.

change from that play mode. Finally, the rear panel houses a special digital-output jack—a first for any CD player, as far as I have been able to determine. At this jack, you can access the full digital code picked up from a CD by the laser pickup, before it is converted to an analog signal by the player's own D/A conversion circuitry. Aside from the obvious ability to dub CDs onto a digital recorder while the musical information is in the digital domain, this special output lets you connect an external digital converter component, such as Sony's DAS-702ES (see sidebar).

The 41-button remote control duplicates virtually every control on the front panel, right down to the volume control.

Measurements

To begin with, let me state that the CDP-650ESD exhibited the flattest frequency response of any CD player I have yet

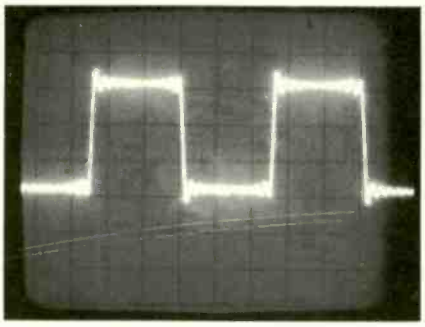


Fig. B5—Square-wave reproduction, 1 kHz, DAS-702ES.

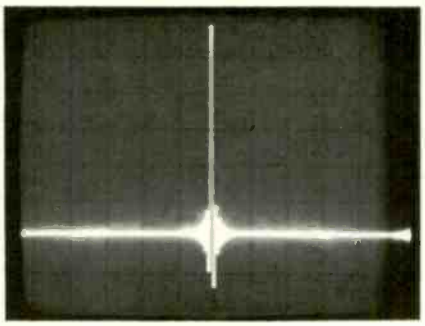


Fig. B6—Single-pulse test, DAS-702ES.

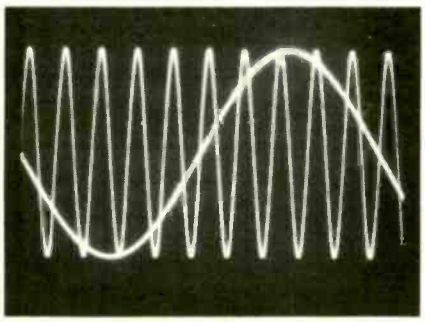


Fig. B7—Two-tone phase-test signal (200 Hz and 2 kHz), DAS-702ES.

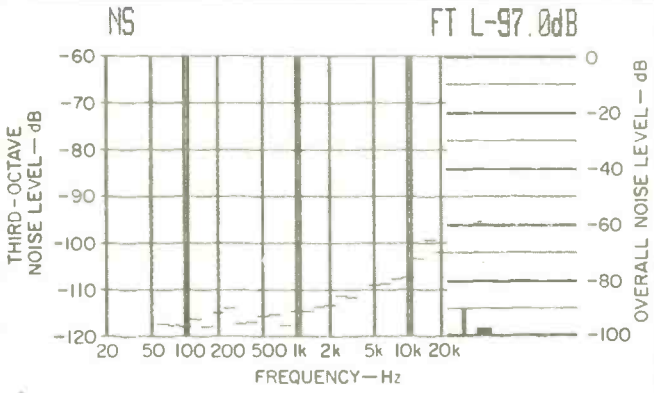
sells (at $1,500) for more than the best complete player they now have available. I look forward eagerly to further tests by others, since without them I will remain rather puzzled by this D/A converter—feeling all the while that perhaps I'm missing the point somewhere. . . . *L.F.*

I have done some fairly extensive A/B tests, with very close mid-band level adjustment, as well as many, many hours of open subjective listening to the CDP-650ESD in comparison with the first-generation player that had perhaps the most highly respected sonics. In the open listening, there was a smoother, less-shrill character to the Sony that sounded as if all frequencies from about 4 kHz and up had been shelved down about a quarter or a half dB. There was an edge to the sound of the other machine, as if a bit of interstation FM noise had been added, noise which was whistley, whiny, and scrapey in character. These differences tended to go away for me when I was doing the A/B tests. However, three other casual, nonaudiophile listeners made the same sort of comments when I was independently demonstrating the unit's disc handling to them. They were not prompted to give any sort of comment on the sound; they volunteered the remarks. My conclusion is that I like to listen to the new Sony in preference to the old player, whether or not there is any hard data from a blind A/B test backing up statements on its sonic superiority.

The sound of the CDP-650ESD when combined with the DAS-702ES was, however, a different story—probably because I had troubles with the converter right from the start. I sent the unit home, via UPS, since I do my most serious listening there. The switch controlling the digital output arrived broken, because of its being located as the most vulnerable component during boxed carrying and because Sony uses the very worst sort of packaging—crushable, coffee-cup foam. I fixed the switch once, and Sony fixed it (very quickly, thank you) after two more trips. Neither fix would have been needed had that switch not been placed at the furthest possible point from the handle for the carry home and if not for that awful foam. Neither is worthy of a top-of-the-line product.

Anyway, I thought that the sound of the combined Sonys was less good than the sound of the 650 alone, but still better than the first-generation player. I do not have sufficient switching facilities to be able to check this sort of a three-way comparison, and I think that my difficulties in getting the 702 working probably influenced my judgment about its character. I'd buy a 650, but in the absence of another use, I'd pass up the 702. *E.P.*

Sound quality of the CDP-650ESD is absolutely magnificent, far better than Sony's first generation of players.



A

B

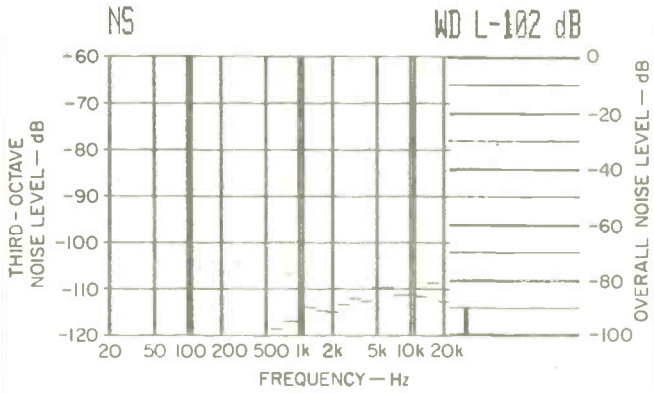


Fig. 5—S/N analysis, unweighted (A) and A-weighted (B).

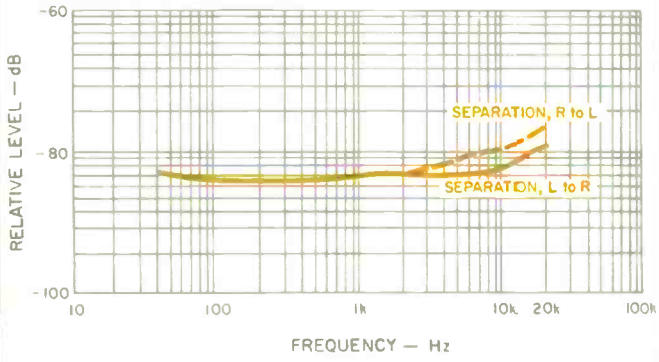


Fig. 6—Separation vs. frequency.

tested. As you examine Fig. 1, a plot of frequency response for the left- and right-channel outputs, you are not going to see very much because the plot of output, for the most part, fell smack on the 0-dB line of the graph. Maximum deviation from absolutely flat response was never more than 0.1 dB, and, as you can see from the notations on the graph, at the highest test frequency (20 kHz), deviation from flat response was 0 dB.

Harmonic distortion at mid-frequencies for a maximum recorded level signal measured under 0.003%. I have tested other players with such low distortion, but I have never run across a player that exhibited such a low distortion figure at high frequencies (0.01% at 20 kHz). Part of the explanation lies in the fact that Sony has swung over to a combination of oversampling and digital filtering—but that's not the whole answer, since many other manufacturers have employed these circuit techniques before. Another factor is the use of a single master clock (as opposed to several nonsynchronized clocks) to synchronize the decoding operations to the 44.1-kHz sampling rate of Compact Discs. Figure 2 shows how harmonic distortion varied with frequency for recorded levels of 0, −24, and −30 dB.

Figures 3 and 4 are perhaps of even greater interest. Figure 3 shows what happens when a test signal is recovered by an earlier generation CD player. The tall spike represents the desired output signal, while shorter, spurious components to the right represent undesired output resulting from nonlinearities in the system and from the use of multiple digital clocks in the decoding system. The same signal, reproduced by the Sony CDP-650ESD, was scanned by a spectrum analyzer in the same way, and the output over a wide spectrum of frequencies is shown in Fig. 4. All that you can see now is the desired output at the left and the random, residual noise floor. There are no unwanted "beat" frequencies at any other point in the display!

Unweighted signal-to-noise ratio measured a very high 97.0 dB, increasing to 102 dB when an A-weighting network was used (see Figs. 5A and 5B). SMPTE IM measured only 0.002% at maximum recorded level and 0.015% at −20 dB recorded level. IHF IM (twin-tone) measured only 0.0021% at 0-dB level and 0.0021% at −10 dB level. Stereo separation, plotted as a function of frequency in Fig. 6, ranged from 82 dB at mid-frequencies to around 76 dB at high frequencies.

This player's reproduction of a 1-kHz square wave is shown in Fig. 7. Notice how much closer this waveform is to a true square wave than were the waveforms other players reproduced from this signal in earlier tests. It's not just that the "ringing" on the leading edge of the square wave, associated with the use of steep, multi-pole analog filters, is absent. There's also much less of the low-level ripple normally seen on the horizontal portions of the square wave with players using digital filtering and oversampling. This suggests very minimal phase shift for the square wave's higher order (high-frequency) components. The virtual absence of any phase shift indicated by the comparison of 200-Hz and 2-kHz signals on opposite channels in Fig. 9 confirms this. In Fig. 9, both the low-frequency (200-Hz) and higher frequency (2-kHz) sine waves cross the zero axis in the same direction, at precisely the same time.

This player is likely to convert those few diehards who are not yet convinced that the CD is the best thing to happen to home audio in many a decade.

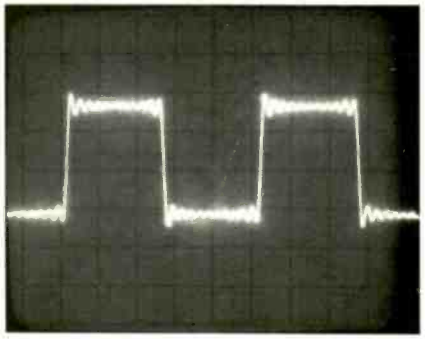


Fig. 7—Square-wave reproduction, 1 kHz.

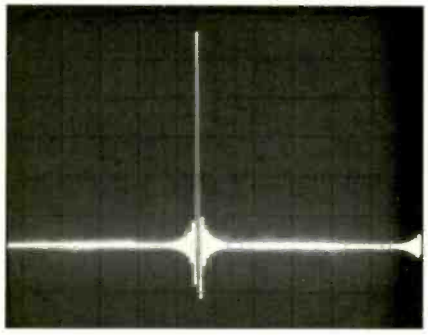


Fig. 8—Single-pulse test.

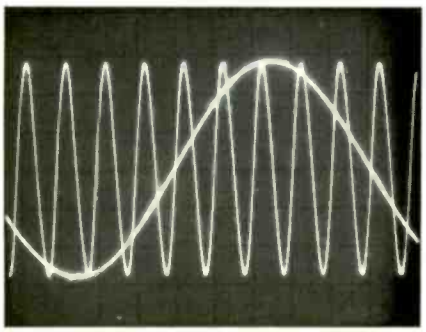


Fig. 9—Two-tone phase-test signal (200 Hz and 2 kHz).

Use and Listening Tests

This feature-laden player has just about every convenience I would want in a CD player. Furthermore, the features are easy to use and are all augmented by the multifunction, wireless remote-control unit which is supplied with the CDP-650ESD. About the only possible feature that Sony has left out is access to a given point on a disc according to time (minutes and seconds into a given track). Sony says that their own opinion surveys of CD-player owners indicated that this feature is rarely used (and seldom requested), while accessing by index (which this player does offer) is increasingly desired.

When I first read that the CDP-650ESD could access any point on a disc within 1 S or less, I presumed that this was a bit of promotional exaggeration, but I felt that no one would really quibble if, in fact, the laser pickup took 2 or even 3 S to reach its destination. Much to my amazement, the claim is no idle exaggeration. I have a special test disc with 99 tracks on it designed to check accuracy of access and other qualities relating to a player's tracking ability. This unit found track 98 in no more than 1 S! I realize that this feat, in and of itself, doesn't really mean that much. But to my mind, it tells me a great deal about the lightweight laser pickup and about the accuracy, speed, and reliability of the new linear motor used in this player. These assemblies and this kind of pickup travel suggest that there will not be much mistracking with this machine: All of its built-in, error-correction circuitry will be available for correcting or concealing errors in discs, with none of it "spent" to compensate for disc-reading errors caused by the player's poor tracking.

Sound quality of the CDP-650ESD is absolutely magnificent. It is far better than the sound quality of Sony's first-generation players, and, with really good software in place, it is also distinctly better sounding than their excellent second-generation players—about which I had nothing but praise last year. I realize that I have used superlatives to describe earlier CD players from Sony, as well as from other manufacturers. It's important to point out that I am talking about relatively minor sonic differences here. Of course, the first players offered great sound—given decent CDs to use with them—and I still maintain that the sound produced by those first- and second-generation players, when playing properly produced CDs, was better, by far, than anything I had heard from LPs or analog tapes. What I am saying now is that the slight problems that I (and others) attributed to some of those early players seem to have been eliminated in this third-generation unit from Sony. I can't tell you if it's their new VLSI chip that's doing the trick or if it's the single master clock, the lighter laser pickup, or the new linear motor. Possibly it's all these things added together, plus the experience gained by Sony's design engineers after nearly three years of intense activity in Compact Disc design. All I know is that the CDP-650ESD is a magnificent-sounding machine that, when heard playing well-made CDs, is likely to convert those few remaining diehards (yes, there are still a few) who aren't yet convinced that the Compact Disc is the best thing that's happened to audio and home sound reproduction in many a decade. Until I can be shown that a better sounding CD player exists, I'm going to consider this model my new standard of reference. *Leonard Feldman*

7

MERIDIAN MCD COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 20 Hz to 20 kHz, ±0.3 dB.
S/N Ratio: Greater than 90 dB (20 Hz to 20 kHz).
Dynamic Range: Greater than 90 dB.
Channel Separation: Greater than 86 dB (20 Hz to 20 kHz).
THD: Less than 0.005%, including noise, at 0-dB recording level.
Output Level: 2.0 V.
Power Consumption: 35 watts.
Dimensions: 12½ in. W × 3 in. H × 10½ in. D (31.8 cm × 7.6 cm × 26.7 cm); with cover open, 7 in. H (17.8 cm).
Weight: 11 lbs. (5 kg).
Price: $699.
Company Address: c/o Madrigal Ltd., P.O. Box 781, Middletown, Conn. 06457.
(Originally published June 1985)

First, let me clear up the questions which have probably already been raised by the photo of the Meridian MCD (which looks remarkably like one of Magnavox's early CD players) and the Madrigal company address. To begin with, Madrigal is the U.S. company that is now distributing products made by those innovators from Great Britain, Messrs. Boothroyd and Stuart, whose Meridian-brand electronics and transducer products have won worldwide acclaim. As for the similarity in appearance between the MCD player and the Magnavox FD1010 (actually, the lowest cost CD player made by Philips in The Netherlands), Madrigal and Meridian make no secret of the fact that they have taken the Philips player and modified it with improved analog electronics and other refinements. In fact, the owner's manual that accompanied my sample is the Magnavox pamphlet normally supplied with their FD1010; only a single, additional sheet of paper, inserted in the printed manual, tells us about the modifications installed by Boothroyd-Stuart to

create the MCD. I hope all of this intercorporate complexity is now clear, so that we can get on with an examination of what Magnavox, Philips, Meridian, Boothroyd-Stuart, and Madrigal have wrought!

Control Layout

The MCD player is one of the few currently available units that do *not* employ a slide-out drawer for inserting CDs. Instead, CDs are placed onto a top-loading turntable which is normally covered by a hinged, transparent-plastic door. Boothroyd-Stuart suggest that, while microphonics are not as big a problem in CD players as they are in conventional analog turntables, the added stability of such a turntable mount is one of the reasons why they chose to modify this particular player. I can't easily verify whether this enhances performance, but certainly the fixed turntable (as opposed to one on a slide-out drawer) can't be doing any harm to the quality of reproduction.

Controls and indicators are all located on a forward-sloping panel, angled for easy viewing and handling. A power on/off button is at the extreme left; to its right are a bank of 15 LEDs which indicate both the number of tracks on a disc and the track that is currently being played or selected. "Pause," "Error," and "Repeat" indicator lights are positioned just to the right of the track LEDs.

To the right of center-panel are three buttons, labelled "Play/Next," "Pause," and "Stop." The "Play/Next" button is used both for initiating disc play and for advancing the laser pickup to the next track during play. Further to the right are a "Repeat" button (for replaying either the entire disc or the programmed track selections) and the "Select," "Cancel," and "Store" buttons used for programming. Each press of "Select" or "Cancel" advances the track indicator to its next LED. To program selections sequentially, advance to each desired track with the "Select" button, then press "Store." To program out unwanted tracks, follow the same procedure, but use "Cancel" instead of "Select." Nonsequential programming is harder: To go back to prior tracks, you must press (or hold down) the "Select" button until the track indicator passes the 15th LED and cycles back from the beginning to your next desired track.

Since there are only 15 LEDs in the display, you cannot program track numbers beyond 15, though the "Play/Next" button will allow you to skip ahead to higher numbered tracks providing you keep a mental note of where you are.

Two pushbuttons with directional arrows, at the extreme right of the control panel, are used to search silently forward or backward to a particular musical passage. Connection from the MCD to your amplifier is made by means of the usual left and right output jacks that are found on the player's rear panel.

Measurements

Figure 1 shows the frequency response for both channels of the Meridian MCD. Once again, I have expanded the vertical scale to 2 dB per vertical division in order to accentuate any slight deviations from perfectly flat response. The maximum deviation was only −0.2 dB at 20 kHz for the left channel and −0.4 dB for the right.

Harmonic distortion at mid-frequencies was 0.007% for a

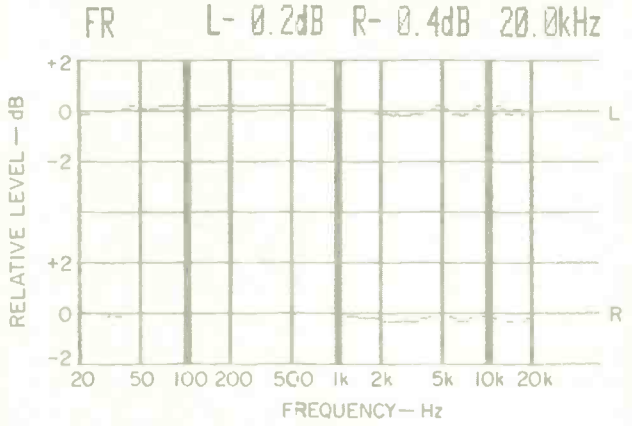


Fig. 1—Frequency response, left (top) and right channels.

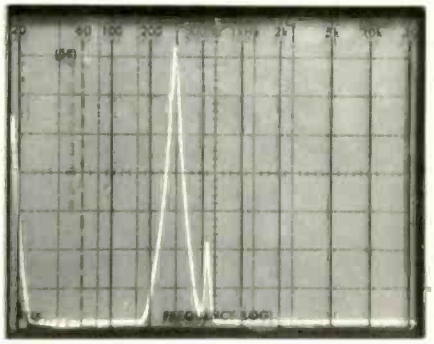


Fig. 2—Spectrum analysis shows 20-kHz test signal (large spike) and inaudible beat tone at approximately 24 kHz (small spike).

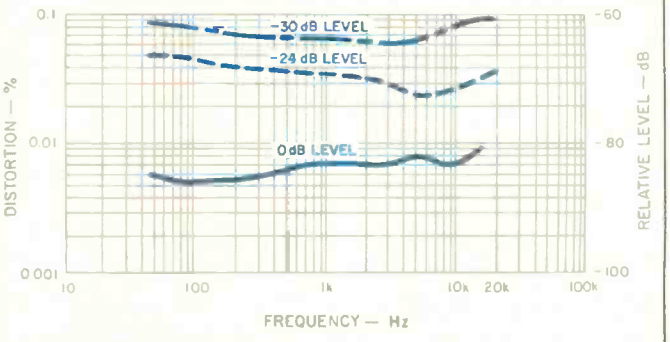


Fig. 3—THD vs. frequency at three output levels.

Unlike other players, the MCD's harmonic distortion was uniformly low over the entire frequency range, showing no rise at higher frequencies.

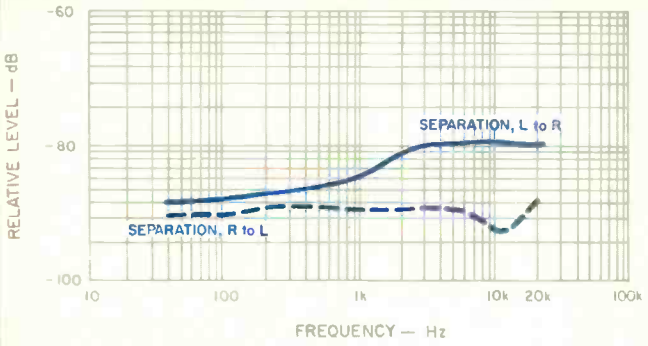


Fig. 4—Separation vs. frequency.

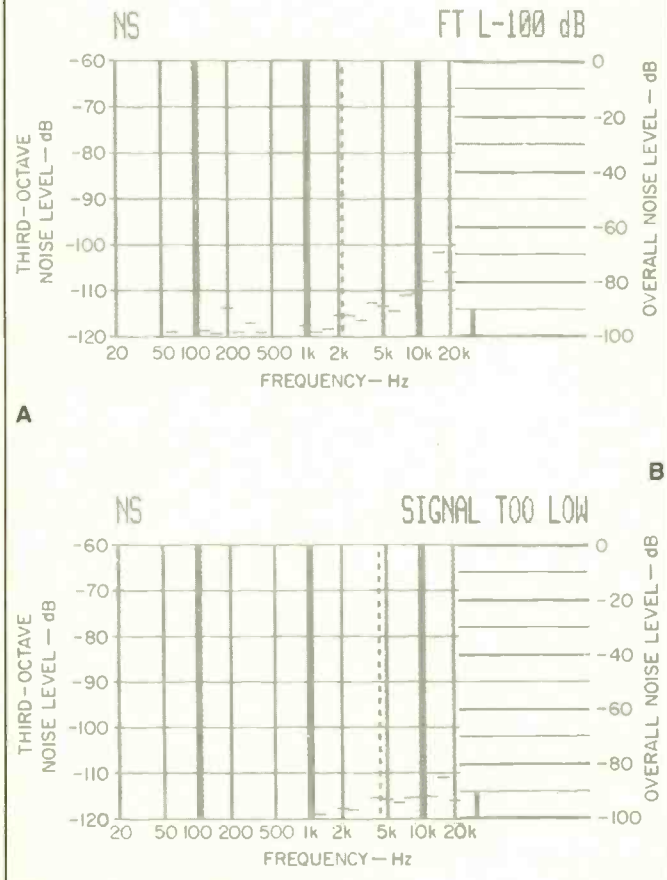


Fig. 5—S/N analysis, both unweighted (A) and A-weighted (B).

test signal at maximum recorded level, and it remained practically constant over the measured frequency range, never rising above 0.008%. In this, the MCD is unlike most other CD players, which usually exhibit rising distortion characteristics at higher frequencies. It may well be that Meridian's improved analog-output amplifier circuitry is in part responsible for this uniformly low distortion level.

Figure 2 shows the usual "beat" frequency component which occurs above 20 kHz when I try to measure THD for high frequencies (in this case, 20 kHz). The extra "blip," seen to the right of the desired 20-kHz signal, is at approximately 24 kHz (the sweep is linear from 0 Hz to 50 kHz in 5-kHz steps), and results from the interaction of the 20-kHz signal with the 44.1-kHz sampling rate of the CD format. The spurious component is, of course, not audible, nor should it be characterized as harmonic distortion.

Figure 3 plots harmonic distortion versus frequency for maximum recorded level as well as for −24 and −30 dB levels. As usual, THD increased at lower recorded levels, but remained an insignificantly low 0.06% even at −30 dB. Output linearity was extremely accurate—to within 0.1 dB—from 0-dB recorded level down to −60 dB. At −80 dB, linearity was off by only 0.3 dB.

Figure 4 shows stereo separation or crosstalk for each channel over the range of frequencies tested. Separation ranged from 79 to 89 dB for the left-to-right channel measurements and from 88 to 92 dB for the right-to-left channel measurements. Obviously, Boothroyd-Stuart's analog output stages were designed to provide good isolation between channels and to achieve the lowest possible distortion and good signal-to-noise ratios.

As for signal-to-noise ratios, they were superb. I measured 100 dB, unweighted, in the absence of a signal, referenced to maximum recorded level. This result, together with a third-octave plot of noise distribution, is shown in Fig. 5A. When I tried to measure the noise level through an A-weighting network, my Sound Technology test instrument objected by displaying the message "SIGNAL TOO LOW" (see Fig. 5B).

SMPTE-IM distortion measured 0.005% at maximum recorded level and increased to a still insignificant 0.03% at −20 dB. Using twin-tone test signals of 19 and 20 kHz, whose sum was equivalent to 0-dB (maximum) recorded level, I measured a CCIF distortion of only 0.0035%. This twin-tone IM distortion increased only slightly, to 0.0063%, at −10 dB recorded level.

Figure 6 shows how a 1-kHz, digitally generated square wave on my test disc was reproduced by the MCD. If you have read my previous CD reports, you will recognize immediately that this player uses digital filtering combined with an oversampling technique. But look more closely at the photo, and see if you don't agree that the reproduced square wave seems to have less "ripple" in it than those produced by other players using the same kind of filtering and D/A conversion. Could it be that some of the imperfections in a reproduced square wave come from the less-than-perfect analog output stages of some CD players—those output stages that have been reconfigured by Boothroyd-Stuart in this MCD?

As for the reproduced unit-impulse signal (Fig. 7), here I

It was no surprise that the MCD could handle all the defects on my test record, or that it showed excellent resistance to mistracking when tapped.

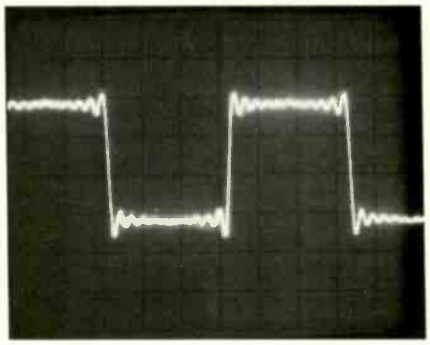


Fig. 6—Square-wave reproduction, 1 kHz.

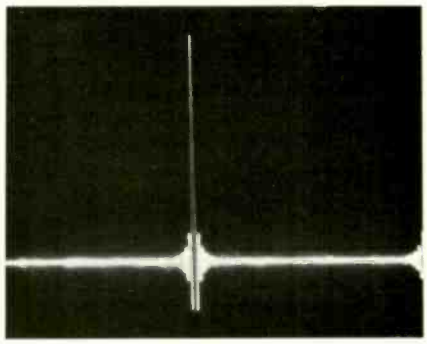


Fig. 7—Single-pulse test.

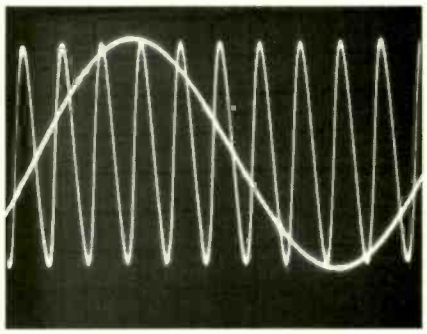


Fig. 8—Phase-error check using 200-Hz and 2-kHz tones.

didn't see any difference between it and the usual 'scope display I get when testing other players that employ this basic type of circuitry. As you might expect, too, there was no evidence of phase error when comparing the 200-Hz output of one channel with the simultaneous, 2-kHz output of the other channel, as seen in Fig. 8. Both sine waves are supposed to cross the zero axis at the same time and in the same direction, and so they do.

It came as no surprise to me that the MCD player was able to play through all the defects in my special error-correction test disc. After all, the original Magnavox FD1000, whose successor was modified to create the MCD version, was also able to play through 900 microns of opaque wedge, simulated dust spots 800 microns in diameter, and a simulated fingerprint smudge. Nor was I surprised to find that the player exhibited excellent resistance to mistracking when it was tapped lightly on its top surface and side panels. I can't necessarily attribute this excellent resistance to outside vibration and shock to the disc-loading method, since I have tested drawer-mount CD players which did as well. I *can* say that the MCD player did as well as the very best units that I have tested in this respect.

Use and Listening Tests

I wish I still had the early Magnavox CD player I tested more than two years ago. I would have loved to be able to conduct a blind or even a double-blind A/B test of the MCD player against that Philips-built unit. (*Editor's Note:* *Audio* reviewer Laurence L. Greenhill did conduct a similar test, comparing the MCD to a Philips CD101 player; his evaluation appears below.) As I recall, the early Magnavox players earned rave reviews from me and from others as far as their sound quality was concerned. But you must remember that two years ago my collection of CDs used in listening tests was much smaller—and there were fewer discs that I could truly call well-recorded, in terms of CD technology and recording technique. Furthermore, hearing memory is, as we all know, extremely short. For all that, it still seems to me that while the MCD player does produce superb sound from every standpoint, I just can't say with complete confidence whether its sound quality really exceeds that of the earlier Magnavox model.

I do have one criticism of the MCD player—or, more precisely, of Boothroyd-Stuart's selection of this particular model as the one to modify. Why did they have to choose the least easily programmable of Magnavox's line of CD players—and the one which accesses desired tracks so slowly? (Meridian does say, though, that later units will have a new control chip for faster access; my sample came from the first production run.) I know that, to many people, this won't seem a problem, especially if they listen to discs straight through. But to listeners who favor popular music, and who play discs that may well contain more than 15 selections, the rather primitive search and programming capabilities of the MCD may well prove to be an irritant.

My best suggestion for anyone considering the purchase of this player would most definitely be to do some serious listening to it—and to competing models. If your ears are keen enough to convince you that the sounds you hear from the MCD are audibly better than those you hear from other CD players, then you must make a couple of other decisions. Are you willing to forgo the fancy programming and random-access frills in return for that better sound quality? If so, are you willing to spend a couple of hundred extra dollars for the sound improvement you hear?

Leonard Feldman

Controlled Listening Test

Do Meridian's modifications produce a different-sounding CD player than the original Philips unit? To answer this question, I invited an audiophile friend, Arnis Balgalvis, to

The Meridian and Philips had distinct, subjective personalities, but these impressions couldn't be statistically confirmed during controlled tests.

join me for an unbiased comparison of the Meridian MCD unit with a stock Philips CD101. Both machines were auditioned for 20-minute periods to identify their sonic characteristics. Then they were plugged into the ABX Co.'s CS-5 comparator system with RM-2 relay module, a device which allows rapid changeover between components with as much time between changeovers as the listener requires. This instrument randomly selects either CD player for a blind test when the listener pushes a randomizing button; the identity of each test trial selection is stored in the comparator's memory for later retrieval. The listener's task is to correctly identify the player chosen by the relay module.

Tests were run using a Levinson ML-7 preamp and ML-9 amplifier connected to Snell Type A/III loudspeakers by Hitachi oxygen-free copper, single-crystal speaker wire. Two identical samples of each Compact Disc, one for each player, were used for evaluation, with the two machines synchronized to the same musical note on the paired discs. Output levels of the two machines were quite close, matching to within 0.05 V (approximately ±0.5 dB), as shown by VTVM measurements at the amplifier outputs using the Philips Audio Frequency Test Sample NR.3 (CD 410 055-2).

The two players had distinct sonic personalities when connected directly to the Levinson preamp's high-level inputs. The early Philips player had substantially more bass, but sounded zippier, with more etched highs and an overall sonic hardness when compared to the Meridian. The latter seemed subdued and muted by comparison, with softer transients and less midrange harshness; it had better depth of imaging but an airier, less solid bass.

These subjective impressions could not be confirmed by the five controlled listening tests which followed. Each test consisted of 16 trials; 12 correct answers were required for the listener to be considered statistically accurate in identifying a player. One of the listeners scored 10 and 11 correct on two separate trials, doing little better than if he had been guessing. The other listener, who claimed he was listening for the Philips player's bass emphasis, scored in the significant range, getting 14 and 15 correct out of 16 attempts. But his score on a third test fell to 10 out of 16 correct after he synchronized the two players' musical outputs more exactly. The signals from the two players were temporarily mixed with a Y-connector while making cueing adjustments. This suggests he may have been detecting synchronization errors to identify the Compact Disc players, not their sonic attributes.

The sonic differences evident on direct, open listening were not statistically confirmed during the double-blind, controlled tests using the equipment listed above. This suggests that the Meridian player's electronic improvements yield only a subtle sonic upgrade.

Laurence L. Greenhill

PIONEER CLD-900

Continued from page 29

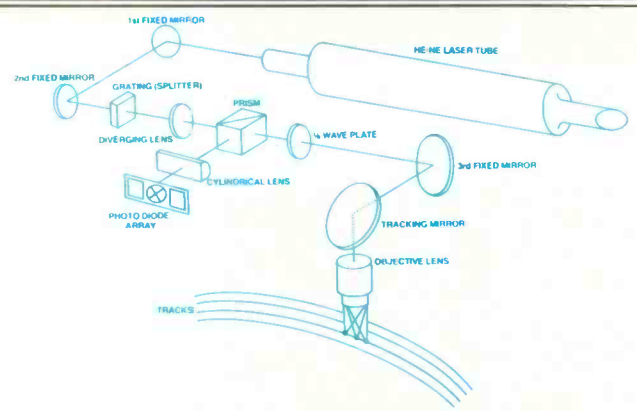
which contained digital (CD format) audio tracks and the AFM tracks normally found on LaserVision videodiscs. Unfortunately, the musical material on this videodisc did not provide sufficient opportunity to compare the two types of soundtracks, even though a switch on the front panel of the unit does let you select "Analog Only" sound. There were few silent passages in this particular disc, so I found it difficult to judge how much quieter the background was when I switched to the digital format.

Of course, when I played my regular CDs on the player, it performed handsomely, offering just about the same high quality of sound I have been getting from most CD players I've been measuring of late, as well as very fast access to a given point in a disc when I used the remote control for programming. As far as I could tell (I had only a Japanese owner's manual), there are no programming features on this machine. That is, you can't store a set of track or index playing instructions in any sort of memory. On the other hand, you can access a given point in a disc both by track and by index points (if the disc has been encoded with them). Audible scanning is also possible, as is scanning of videodiscs at a variety of fast- and slow-motion speeds.

I found the hand-held remote control easy to use. Color coding helps you push the right buttons for the right functions. Blue buttons are exclusively used for videodisc functions, while green buttons are used exclusively in CD operations. Buttons lacking either of these colors perform equivalent functions for both program sources.

As for the displays which are visible on your TV screen while you use the player for CD reproduction, you *don't* have to keep your TV set on for that display. Remember, the player itself tells you the track you're playing, and that's really the most important display you need when listening to a CD. Still, I found the video display to be a delightful addition, and I must confess I couldn't help gazing at it as I listened to my CDs. No doubt I would have grown tired of this feature in time, and so, probably, will you. But you're not likely to tire of the excellent video reproduction and, now, the excellent sound quality you can get from this combination player. It's been a long time since Bart Locanthi hinted that such a unit would someday be available, but the CLD-900 has been worth the long anticipation and the long wait.

Leonard Feldman



A typical LaserVision videodisc optical system, such as this, is similar in principle to a CD player's.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COMPACT disc DIGITAL AUDIO
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8

TECHNICS SL-P3 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 4 Hz to 20 kHz, ±0.5 dB.
Dynamic Range: Greater than 96 dB.
S/N Ratio: Greater than 96 dB.
THD: Less than 0.003% at 1 kHz, 0-dB recorded level.
Channel Separation: Greater than 90 dB.
Number of Programmable Selections: 15.
Output Level: 2.0 V for 0-dB recorded level.
Headphone Output Level: 80 mW into 32-ohm load, adjustable.
Power Consumption: 33 watts.
Dimensions: 16-15/16 in. W × 3¼ in. H × 13⅛ in. D (43 cm × 8.2 cm × 33.4 cm).
Weight: 11.7 lbs. (5.3 kg).
Price: $600.
Company Address: One Panasonic Way, Secaucus, N.J. 07094.
(Originally published August 1985)

More and more companies are now offering third-generation CD players. One of the more recent introductions is Technics' SL-P3, the top model in a group of three totally redesigned units from that company. From the looks of it, the designers sought to incorporate just about every convenience feature imaginable, having now had three years in which to survey the needs of consumers and the features that were available in first- and second-generation Compact Disc players.

Besides a 15-step, random-access programming capability, the SL-P3 offers a multi-function wireless remote control, expanded repeat functions, automatic pause, automatic cueing and an output level control with an associated LED level indicator. The wireless remote-control unit is able to perform the random-access programming functions, and even to adjust volume.

Another new and unusual feature on the SL-P3 is the "Disc Prism." Found on the motor-driven loading drawer, this prism arrangement reflects the image of the spinning CD forward. You can therefore see that a disc has been loaded into the player while you view the front panel, even though the disc is actually oriented horizontally. I suspect that this novel arrangement (including illumination of the prism for easier viewing) was developed to counter the uneasiness of some consumers over the fact that their discs "disappear" inside their CD players, and their doubts about whether the disc will ever be recovered. (Of course, these nightmares are unlikely to happen in reality.)

Control Layout

Major operating controls of the SL-P3 are larger and more easily accessed than the less often-used switches. The lower part of the player's front panel is slanted toward the user, so all control keys can be seen and operated easily. Ten numbered keys and a memory key, positioned on this section of the panel, are used to perform the 15-selection, random-access programming. You can choose which tracks you want to hear in whatever order you prefer; direct access by track numbers can also be performed using these keys, as can programming and direct access by index numbers. (Index numbers are now found on an increasing number of CDs; they subdivide longer tracks, such as movements of a symphony, into recognizable parts—musical themes, for example. For those who want to quickly access a specific theme within a movement, index numbers provide the means.)

The "Repeat" button lets you listen to the entire disc, or programmed shorter sections of the disc, over and over again. The "A-B Repeat" button permits instant replay of any specified section selected during the playing of a disc. Automatic "Music Scan" lets you preview the first few seconds of each track in a disc; the number of seconds can be adjusted by using the numbered front-panel keys, from 1 to 99 S. Sliding a switch, at the lower left of the front panel, to the "Auto Pause" position causes the laser pickup to pause at the beginning of each track. Moving this switch to "Auto Cue" makes the SL-P3 stand by at the beginning of each selection for instant starts at the touch of a button. With auto cueing engaged, the system seeks out the first note on each track and activates a "Cue Standby" indicator when ready.

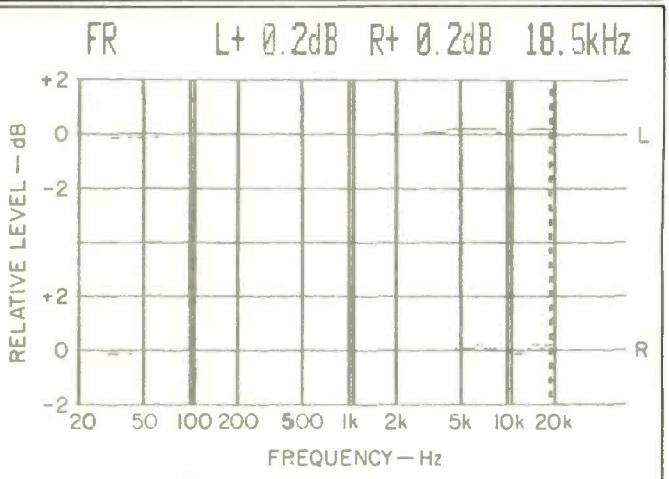

Fig. 1—Frequency response, left (top) and right channels.

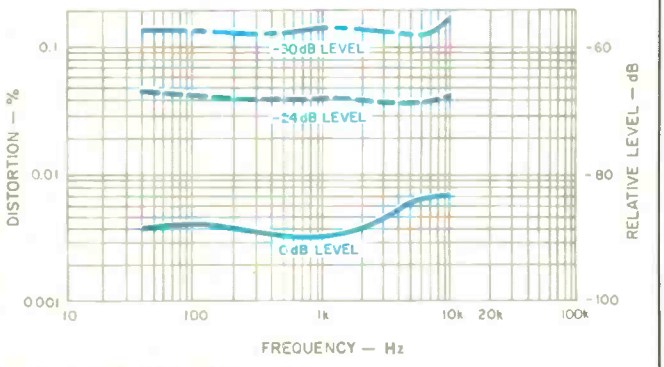

Fig. 2—THD vs. frequency at three output levels.

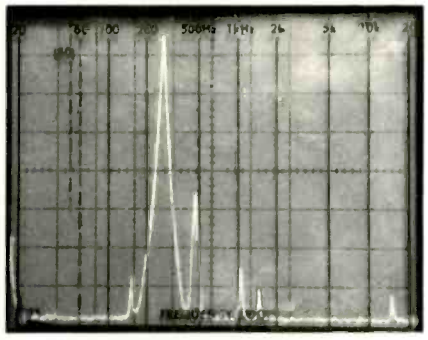

Fig. 3—Spectrum analysis of 20-kHz signal (large spike) shows inaudible beat tone at 24.1 kHz, about 45 dB lower than the desired output.

A "Disc Prism" on the loading drawer makes the spinning CD easily visible, which eliminates any uneasiness caused by "disappearing" discs.

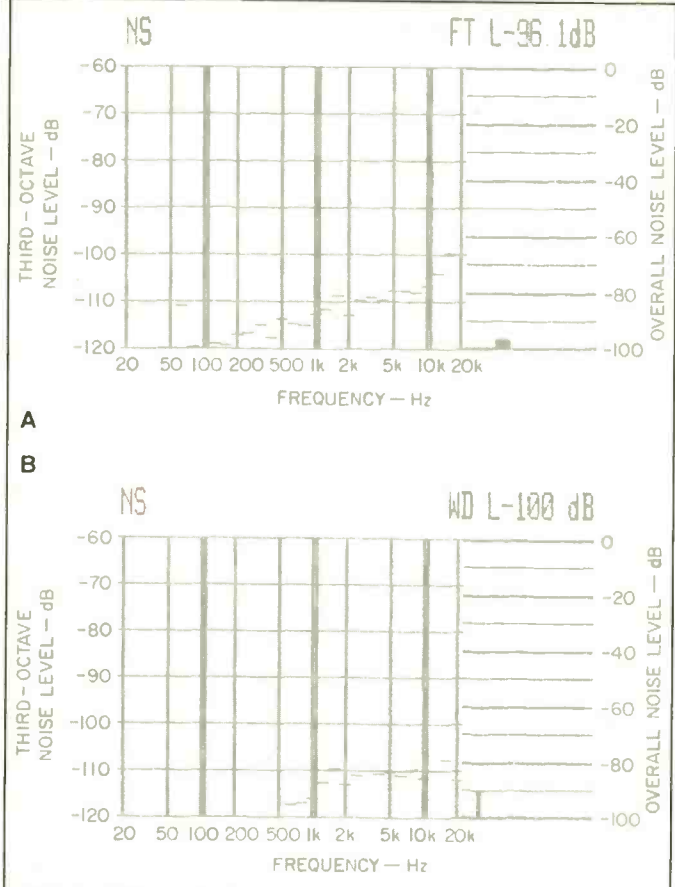

Fig. 4—S/N analysis, both unweighted (A) and A-weighted (B).

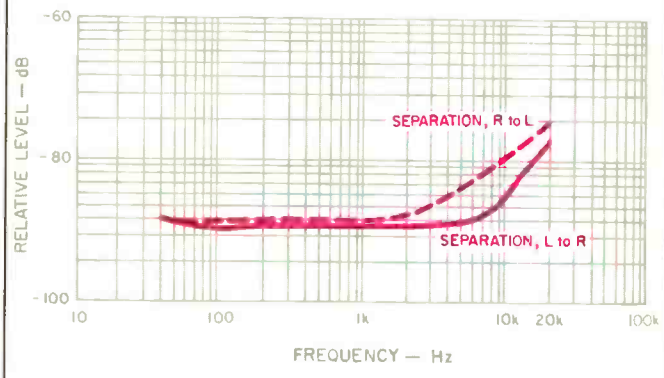

Fig. 5—Separation vs. frequency.

The auto cueing function differs from "Auto Pause," since there may be a few seconds of time between the start of a given track and the actual start of music on that track. The auto-cue feature will be especially welcomed by disc jockeys who use this machine for broadcast, since it will permit more accurate cueing than is possible by simply specifying a track number.

Up/down output level buttons that control volume electronically are also provided on the front panel, while a "Rem Time" key displays the total time remaining on a disc during play whenever it is pressed. The larger, more basic keys include "Play," "Stop," "Search" (bidirectional) and "Pause." The "Search" keys operate at high and low speeds, and let you hear sounds at normal pitch. "Skip" keys move the laser pickup forward or backward over any number of tracks, depending upon the number of times the key is pushed.

The large, fluorescent display includes a 15-bar horizontal graph which indicates which track is playing by blinking the bar corresponding to that track. The display also shows track number and index number, as well as total playing time and remaining play time in minutes and seconds. Indicators are also provided for the repeat function, A-B repeat, music scan, 15-track overrun (in the event that a given disc contains more than 15 tracks), and disc compartment status.

The Technics SL-P3 is also equipped with a headphone jack with its own separate volume control, and an automatic-timer play mode.

Measurements

Frequency response for this CD player, plotted in Fig. 1 for both the left and right channels, was flat within 0.2 dB over the entire audio range, from 20 Hz to 20 kHz. Harmonic distortion at maximum recorded level varied from 0.0035% to 0.007%, depending upon the test frequency used. Figure 2 shows how THD varies with both frequency and reference recorded level. Notice that I did not plot THD above 10 kHz. At high frequencies, my distortion analyzer began to read unusually high numbers which I suspected were not really harmonic distortion. Spectrum analysis revealed that these higher readings were, in fact, super-audible "beats" outside the audio spectrum, and Fig. 3 illustrates this. The range of sweep in this photo is from 0 Hz to 50 kHz, in linear increments of 5 kHz per horizontal division. The tall spike in the display represents a desired 20-kHz signal, while the shorter spike, immediately to its right, is a signal at a frequency of approximately 24.1 kHz. It is only about 45 to 46 dB lower than the desired signal, which explains why the distortion analyzer read nearly 0.5%. Despite the high meter reading of my distortion analyzer, the presence of this ultrasonic beat frequency did not interfere with the sound quality of the player.

Unweighted signal-to-noise ratio measured just over 96 dB; residual noise of the player is analyzed in the graph of Fig. 4A. When an A-weighting network was added to the measurement setup, the signal-to-noise ratio was even higher—100.0 dB exactly, as shown in Fig. 4B. IM distortion at maximum recorded level was only 0.0075%, increasing to a still inaudible 0.017% at −20 dB recorded level. Output

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One way to judge a player is to check its tracking and error-correction ability. In those areas, the SL-P3 won high marks.

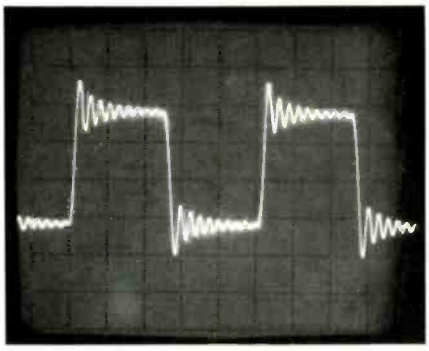


Fig. 6—Reproduction of 1-kHz square wave.

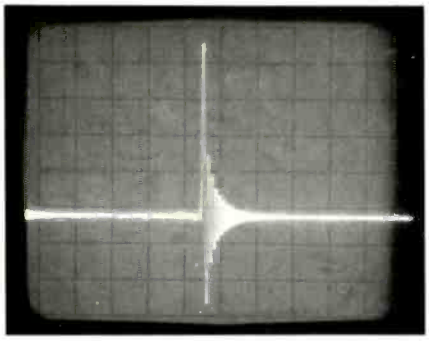


Fig. 7—Single-pulse test.

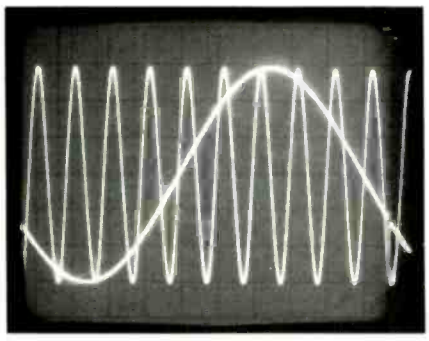


Fig. 8—Phase-error test using tones of 200 Hz (left channel) and 2 kHz (right channel).

linearity was accurate to within 0.5 dB down to −80 dB. Maximum output level was exactly 2.0 V, but, of course, if the player's variable output level control is used, this can be adjusted to suit the needs of any amplifier and to conform with other program sources which the user's audio system may include.

Stereo separation was about what I have come to expect from CD players, ranging from over 75 dB at the high-frequency extremes to nearly 90 dB. A plot of separation versus frequency for both left-to-right and right-to-left channel crosstalk is shown in Fig. 5.

Figures 6 and 7 clearly demonstrate that Technics has chosen to stay with multi-pole, analog output filters. The 1-kHz square wave shown in Fig. 6 exhibits the type of ringing normally associated with such output filters, as does the overhang or ringing seen in the reproduced unit-pulse test signal shown in Fig. 7.

Despite the use of a steep filter, however, the relationship between the 200-Hz signal on the left channel and the 2-kHz signal on the right, reproduced in the 'scope photo of Fig. 8, shows no evidence of any phase shift or phase delay at the higher of the two frequencies.

Since most CD players offer superlative sound quality, assessment of tracking and error-correction ability is one of the important ways to judge differences between models. One of the more noteworthy improvements I've been finding on second- and third-generation players is their ability to handle severe dropouts and other disc defects. In these areas, the SL-P3 won high marks, playing through my "obstacle course" disc—the one with the built-in defects and opaque sections—as if the disc were perfect. The player also resisted mistracking when subjected to moderate external vibration or shock.

Use and Listening Tests

I found the Technics SL-P3 extremely easy to use and easy to program, despite its rather elaborate programming functions. Controls are logically arranged, and logically and intelligently identified. The lightweight, hand-held wireless remote control performs just about every function you would want to direct from across a room, short of opening the disc drawer itself.

Sound quality was as good as I have come to expect from a well-engineered player. Evidently there's more to making a CD player sound good than simply going to oversampling or to digital filtering (both of which Technics chose not to do in this model). Depth and breadth of stereo imaging was very good, and only some of my older discs exhibited the high-frequency graininess that has been attributed to CDs and CD players in general. Some more recently acquired CDs sounded just fine, and I found that the speed of access, characteristic of the third-generation players, was about 1 S between any two points on the disc.

Perhaps the thing that impressed me most about this new Technics model was not so much its excellent sound quality (I've come to expect that from all late-model players) but rather the number of useful features available. Barely two years ago, a player having all these features, if available at all, would have easily cost twice as much as this one does.

Leonard Feldman

Digital Precision

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

AKAI

9

SONY PCM-501ES DIGITAL AUDIO PROCESSOR

Manufacturer's Specifications

Frequency Response: 10 Hz to 20 kHz, ±0.5 dB.

Harmonic Distortion: 14-bit format, less than 0.007%; 16-bit format, less than 0.005%.

Dynamic Range: 14-bit format, greater than 86 dB; 16-bit format, greater than 90 dB.

Channel Separation: Greater than 80 dB.

Input Levels: Line, 0.24 V for −10 dB reference level; video, 1 V peak-to-peak.

Output Levels: Line, 0.24 V for −10 dB reference level; monitor, video, and copy outputs, 1 V peak-to-peak; headphones, 0.003 to 0.9 mW into 32 ohms, continuously adjustable.

Power Requirements: 120 V a.c., 60 Hz, 33 watts.

Dimensions: 17 in. W × 3¼ in. H × 14⅞ in. D (43 cm × 8 cm × 35 cm).

Weight: 13 lbs., 3 oz. (6 kg).

Price: $750.

Company Address: Sony Drive, Park Ridge, N.J. 07656.

(Originally published September 1985)

The first PCM digital audio processor intended for home use that I ever tested weighed about 50 pounds and cost more than $5,000. That was back in 1978, when Sony introduced their PCM-1—a massive-looking unit that could be hooked up to a VCR for PCM (digital) audio recording and playback. Back then, a multi-national committee was still at work at setting standards for this kind of product. About a year later the PCM-10 was introduced. It was still just about as heavy and just about as bulky as its predecessor, but it conformed to the newly agreed-to standards for PCM processors.

More recently, other PCM processors have appeared—all at considerably lower cost—including the renowned PCM-F1 from Sony, a portable, battery-operated unit that became popular with audio professionals and with audio hobbyists. Used with any portable VCR, the PCM-F1 made it possible to record musical events in the field with hitherto unheard-of fidelity and accuracy. Remote recording events, which for-

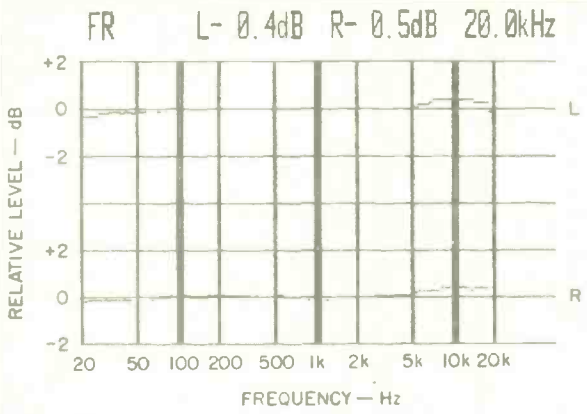
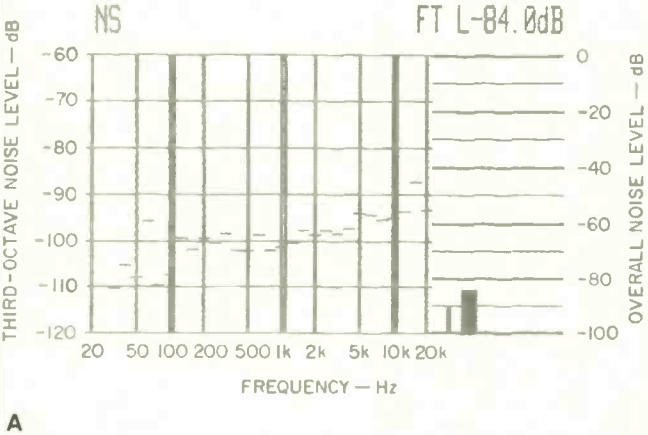


Fig. 1—Frequency response, left (top) and right channels.



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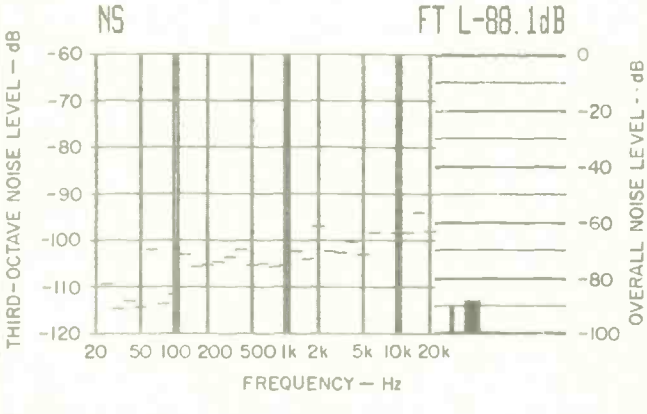


B

Fig. 2—Unweighted S/N analysis in 14-bit mode (A) and 16-bit mode (B).

merly required hundreds of pounds of reel-to-reel recorders, mixers, amplifiers and mixing consoles, could now be handled with a small VCR plus the tiny PCM-F1 processor and a couple of well-placed microphones. No wonder the PCM-F1 found favor more with the pro audio folks than with the home users for whom it had originally been intended.

Not content with that accomplishment, Sony went on to introduce, a couple of years ago, the PCM-701, a processor which sold for only $1,200 and which occupied no more space than a typical amplifier. Now, further integration of circuitry plus the experience gained in other digital-audio areas (such as CD and professional digital recording equipment) has enabled Sony to produce the lowest-priced PCM processor ever, the PCM-501ES.

Besides being considerably less expensive than any previous PCM processor, the new PCM-501ES incorporates a host of features that serious recording enthusiasts will find useful. For one thing, the unit offers both 14-bit and 16-bit recording and playback configurations. Both formats conform to the technical specifications of the EIAJ; thus, any tape recorded using another digital processor that conforms to either EIAJ format can be played back using this unit. Furthermore, the PCM-501ES allows you to copy tapes *digitally* without having to decode them first from digital to analog. If a tape recorded in the 16-bit format is duplicated using this digital tape-copy function, the copy can automatically be converted to the more common 14-bit format.

Sony incorporated both formats because the 16-bit mode offers somewhat wider dynamic range and lower distortion, while the 14-bit mode has somewhat better error-correction capability. Specifically, burst errors of up to 32 horizontal video-format lines can be corrected in the 14-bit mode, while the 16-bit mode only allows correction of burst errors up to 16 lines long. As is true of other digital systems, the PCM-501ES can compensate for burst errors too large for it to correct so that the errors are not perceptible. Interleaving disperses dropout errors by changing the sequence of information blocks or "words" in the recording. When restored to the original order during playback, the words containing errors are therefore placed between error-free words, so linear interpolation can mask the errors.

Another new feature found on the PCM-501ES is called Optimum Video Condition (OVC) control. This is used in conjunction with the associated VCR's tracking control and a series of indicator lights on the PCM-501ES, to obtain the optimum relationship between the VCR and the processor regardless of tape speed set on the VCR. Furthermore, when adjusting the VCR's tracking control, one of the processor's level meters can serve the added function of showing when optimum VCR tracking has been attained. Finally, an Auto Playback Mute circuit, when activated, will cause the system to mute in the presence of frequent dropouts or dusty tape.

Control Layout

A "Power" switch and headphone jack are found at the left end of the all-black front panel of the PCM-501ES. A rotary headphone-output level control is next to the phone jack; to its right is the "OVC" control described earlier. Two pushbuttons are used to select either 14-bit or 16-bit digital

You have to get used to the fact that 0 dB is truly the maximum recording level reasonable. Go above it and you'll be in trouble.

resolution; to their right are three pushbuttons arranged in a vertical row and labelled "Copy," "Auto PB Mute" and "Tracking." The "Copy" button is pushed when you want to make a digital copy of a digital tape using two VCRs. The "Tracking" button converts the peak program LED meter into a tracking meter, as described above; the function of the "Auto PB Mute" button has also already been described.

The large, easy-to-read display to the right of these three buttons serves primarily as a dual-channel record-level metering system (or as a tracking-control indicator). To the left and right of the LED banks are indicator lights which denote 14-bit or 16-bit resolution; activation of the built-in emphasis/de-emphasis circuits, playback muting, and the "Copy" feature, as well as activation of a "Rec Mute" button located just to the right of the display area. This button allows you to interject a signal recording level of zero to create blank spaces or pauses between musical selections. Dual-concentric, calibrated control knobs at the right end of the panel serve as master recording level controls.

The rear panel of the PCM processor has stereo pairs of line-in and line-out jacks, video in and out jacks, the "Copy Out" jack used for copying a tape from one VCR to another, and a monitor-out jack. The latter allows you to monitor an ordinary video signal connected to a TV monitor without having to change connections when you want to use your VCR for its primary purpose, watching recorded television programs.

Measurements

In order to determine the difference, if any, between 14-bit and 16-bit operation of this PCM processor I decided to measure all characteristics of the machine in both operating modes. The first thing I discovered is that there was no measurable difference in frequency response when switching from 14-bit to 16-bit operation. Overall record/playback frequency response for both channels, shown in Fig. 1, was well within the ±0.5 dB tolerance specified by Sony.

Figures 2A and 2B show unweighted signal-to-noise ratios obtained for each digital resolution format. For the 14-bit mode I measured 84.0 dB of S/N, while in the 16-bit mode S/N increased to 88.1 dB. Adding an A-weighting network, the S/N figures improved still further, to 86.9 dB for the 14-bit mode and 90.7 dB for 16-bit operation (see Figs. 3A and 3B). A very slight improvement in harmonic-distortion levels was measured, too, when I switched digital resolution from 14 to 16 bits. For the former mode, I measured a THD of only 0.006%, which decreased to an even lower 0.004% when I switched to 16-bit.

One of the things you have to get used to when using a digital processor for audio recording is the fact that "0 dB" is truly the maximum recording level reasonable. Go above it and you will be in trouble immediately. To illustrate the point, I used the distortion plotting feature of my Sound Technology 1500A tester to see what would happen at higher recording levels. The results for both 14-bit and 16-bit operation are shown in Figs. 4A and 4B: At +2 dB recording level, THD had already jumped up to about 2.7%. Yet, at 0 dB recording level, distortion had been so low that this instrument was incapable of registering a reading. I had to use my dedicated distortion analyzer to read the 0.004% and 0.006% numbers mentioned above.

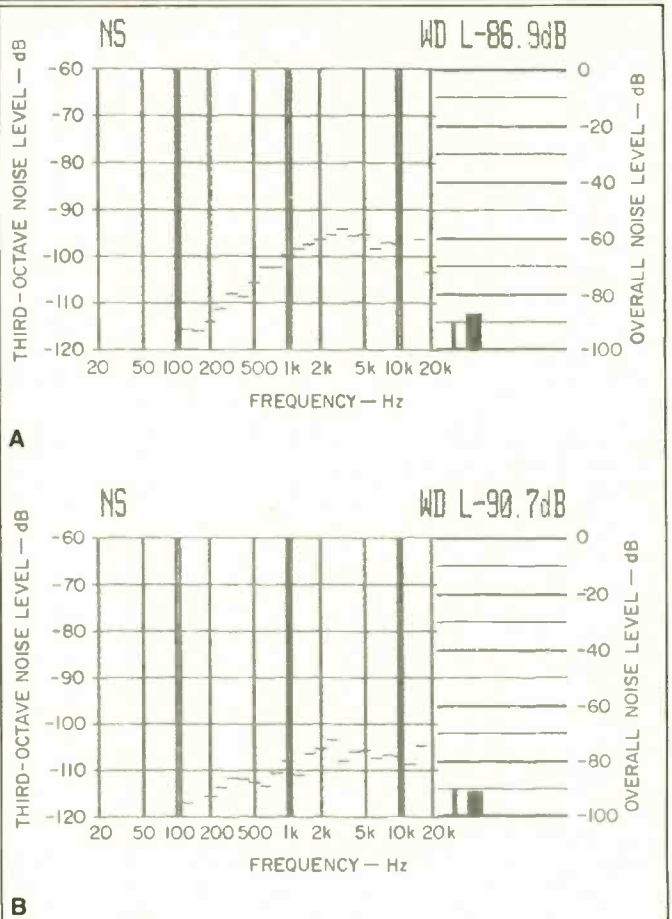


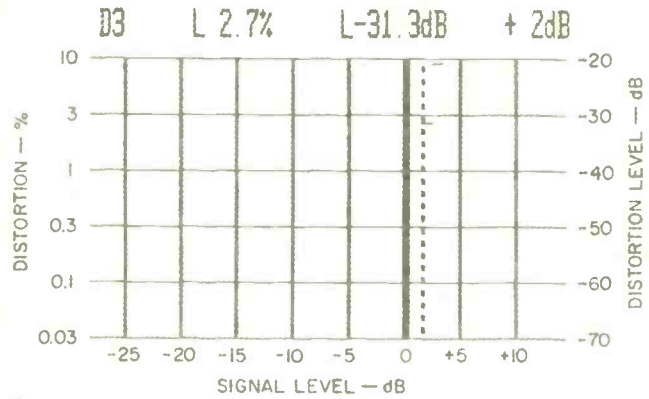
Fig. 3—A-weighted S/N analysis in 14-bit mode (A) and 16-bit mode (B).

Channel separation is plotted in Fig. 5. Even at 16 kHz, separation still ranged between 69.4 and 73.7 dB (depending upon which channel was being measured). At mid-frequencies, separation was between 90.6 dB and 92.0 dB, again depending upon whether I measured left-to-right or right-to-left separation.

Use and Listening Tests

One of the problems I have run into with earlier PCM processors is their inability to record signals faithfully when the associated VCR was operated at its slowest tape speed (either Beta III or VHS EP). The first unit to overcome this problem was Sansui's TriCode PCM processor (see *Audio*, January 1984.) The Sony PCM-501ES is the second unit to successfully use the slower VCR tape speeds for digital audio recording. This means that with a Beta VCR you can

Because the PCM-501ES gets good results with the slower VCR tape speeds, you can record from 5 to 8 hours of superb digital audio on a single cassette.



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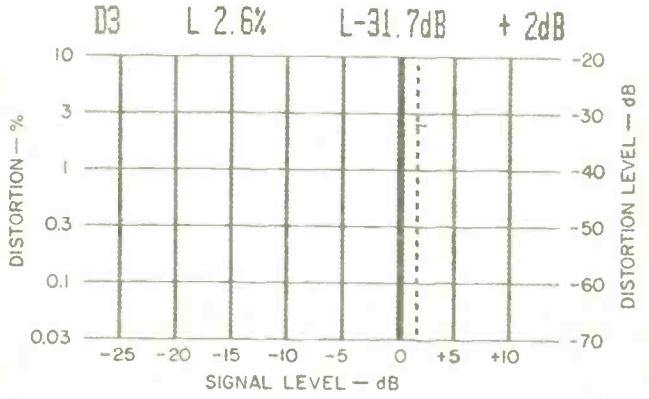

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Fig. 4—Third-order distortion vs. level in 14-bit mode (A) and 16-bit mode (B). As is typical of digital systems, distortion is negligible below 0 dB, but begins rising swiftly as soon as that limit is passed.

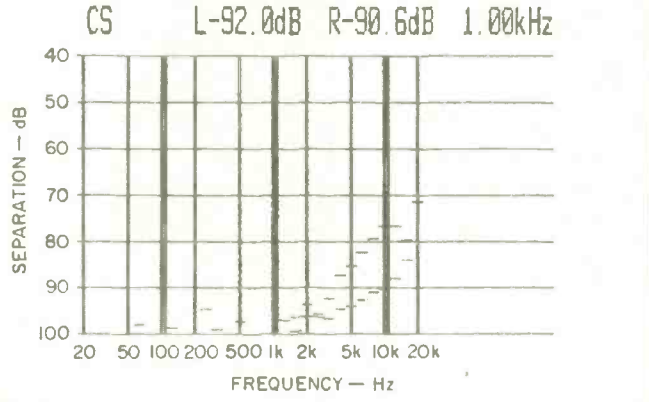


Fig. 5—Separation vs. frequency.

get up to 5 hours of superb digital audio on a single cassette tape and 8 hours' worth with a VHS recorder. Furthermore, the OVC control really lets you optimize performance in these slow-speed modes so that as little interpolation as possible is necessary to fill in for missing data. The tracking indicator is also a great help in optimizing the performance of the VCR in relation to the processor.

The "Copy Out" feature will appeal to audio enthusiasts who want to make copies of their homemade, digitally recorded musical performances. Since there doesn't seem to be a great deal of prerecorded software available for use with PCM processor/VCR combinations, I don't yet see the present need for this feature.

In my own experiments, I transcribed sample selections from some of my favorite CDs, both in the 14-bit and 16-bit formats. During certain soft passages, I was able to detect a slight difference in residual noise levels, but only when I turned up listening levels to unrealistically loud settings. As for tonal quality, in A-B tests between the original CD and its digitally recorded equivalent on VCR tape, I confess that I could not tell the difference. The only time I thought I heard a difference was when I deliberately experimented with some off-brand, "bargain" videotape I had lying around the lab from an earlier experiment. Some of this tape was so bad that, with the Playback Mute Control activated, I did hear moments of muting when error rates exceeded the error-correction capabilities of the system. With playback muting off, under the same conditions, there was no audible muting, but I did detect occasional changes in timbre when making direct comparisons with the CD source material. I can only attribute these changes to a relatively large number of interpolations which the system was being called upon to perform.

After becoming accustomed to using high-quality, three-head reel-to-reel and even cassette tape decks, it's a bit frustrating to have to wait for playback to find out how well a recording came out, but that's the way all PCM processor/VCR combinations work. Just as you can't monitor a video recording using any home VCR, so too is it impossible to monitor a PCM audio recording made on VCR tape. Under these conditions, it's especially important to stay below that 0-dB indication on the level meters of the PCM-501ES. Exceed that point and you are going to hear horrendous levels of distortion during playback, since you will have come up against the insurmountable level limit imposed by any digital audio recording system—the point where you run out of "numbers" to describe the loudest sample of the music you are recording. That's the point when the sample you record consists entirely of ones—14 of them in the 14-bit mode or 16 of them if you use the higher resolution format.

Perhaps some day, when standards are agreed upon for a dedicated Digital Audio Tape (DAT) recording system, provision may be made for the kind of as-you-record monitoring system that many of us enjoy with our analog recorders. Until that day comes, if you have a need or desire to record music and speech digitally, the least expensive way is with a VCR, and a PCM processor such as Sony's beautifully engineered and produced PCM-501ES.

Leonard Feldman

10

SONY CDP-620ES COMPACT DISC PLAYER

Manufacturer's Specfications
Frequency Response: 2 Hz to 20 kHz, ±0.3 dB.
Harmonic Distortion: Less than 0.0025% at 1 kHz.
Dynamic Range: Greater than 96 dB.
Channel Separation: Greater than 95 dB.
Number of Programmable Selections: 20.
Output Levels: 2.0 V, fixed; up to 2.0 V maximum, variable.
Power Requirements: 120 V, 60 Hz, 16 watts.
Dimensions: 17 in. W × 3¼ in. H × 14⅜ in. D (43 cm × 8 cm × 36.5 cm).
Weight: 19 lbs., 14 oz. (9 kg).
Price: $950.

Company Address: Sony Drive, Park Ridge, N.J. 07656.
(Originally published September 1985)

It's been only a short time since I tested and wrote about Sony's top-of-the-line Model CDP-650ESD Compact Disc player (see *Audio*, July 1985). While other CD-player prices were plummeting, Sony maintained that there would always be a market for a state-of-the-art unit that employed the very latest technology and offered all the features a serious user could possibly ever want. My review of the CDP-650ESD was nothing short of ecstatic. I still regard that player as the definitive model, one that can serve as a reference for judging other CD players both in terms of sound quality and in terms of features. That unit, however, has a suggested price of $1,300—rather steep in view of the fact that perfectly adequate (if basic) CD players can be had for around $300 or even a bit less, even from the very same Sony Corporation.

Sony must have realized that these days a $1,300 player is not something throngs of people will wait in line to purchase. Accordingly, they have now come up with the CDP-620ES—a very slightly downgraded version of the CDP-650ESD that incorporates pretty much all of the new technology found in the more expensive player, but which sells for a full $350 less. What has Sony omitted in order to accomplish this cost savings? According to them, the main visible difference between the 650 and the 620 is the omission of the 650's unique digital-code output port on the rear panel of the lower cost unit. I'm not referring to the special accessory connector that will be needed for attaching a video-graphics interface box when those become available; both the 650 and the 620 have that connector. I'm talking about the additional connector that gives the user access to the audio bit stream itself and therefore allows digital-to-digital audio data transfer. Also, the CDP-650ESD's chassis is of anodized copper (which probably contributes substantially to the price difference, and which Sony says has better resonant and thermal properties). In addition, the more expensive model has more massive feet.

I found a couple of other differences—minor ones—between the two players, that the people at Sony didn't mention. The first of these has to do with the grid-like track-number display on the front panel. The CDP-650ESD's grid shows a total of 20 numbers, while the 620 displays only 18, though 20 programmable playing steps can still be memorized by the lower-priced unit. The final difference I discovered between the two units is a feature found on the 620 that is actually not present on the higher priced 650. That's the headphone output jack. According to the people at Sony, introducing a headphone amplifier in the circuitry of a "pure" CD player such as the 650 can actually affect sound quality a trifle, so it was not done. The lower priced 620, I guess, is not regarded as a CD player in which total perfection is the goal, so its designers compromised enough to incorporate a headphone amplifier and its associated output jack with level control.

As for myself, I welcome the addition of the jack on the lower cost unit; and if it introduced any sound degradation, I confess that I failed to hear it!

Control Layout

The front panel of the CDP-620ES is almost identical to that of the CDP-650ESD. The disc-loading drawer remains pretty much as it has been on earlier Sony home players: It is opened by touching an "Open/Close" button to its right, and is closed by touching the drawer front, the "Open/Close" key again, or the "Play" button. Numbered keys from 0 to 20, plus a key labelled "+10," are found near panel center and are used to call up desired tracks for play or to perform random-access programming. The "+10" button speeds up the process if you want to call up a track number above 20. Track 44, for example (if one existed on the disc you've inserted), would be called up by touching the "+10" button four times, and then touching the "4" button. "Play," "Pause," "AMS" (automatic track advance and track retard) and "Play Mode" keys ("Continue," "Single" and "Program") are found to the right of the numeric keyboard; "Check" and "Clear" keys used for verifying programmed instructions or for clearing them from memory are located below the numeric keys. A "Stop" key and two manual search keys are near the front panel's lower right corner. The search keys are used for fast access, in either direction, to a given point on a disc while you are listening to it.

I welcome the addition of a headphone jack to the new Sony player. If it degrades the sound, I confess that I failed to hear it.

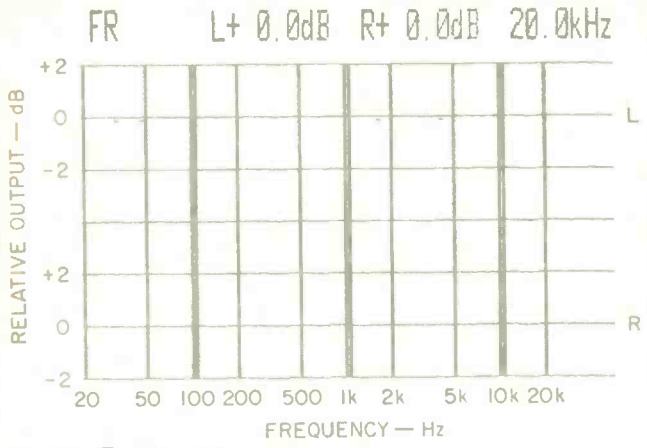


Fig. 1—Frequency response, left (top) and right channels.

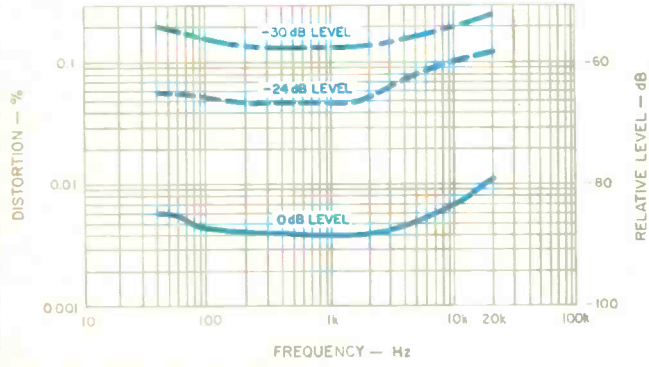


Fig. 2—THD vs. frequency at three signal levels.

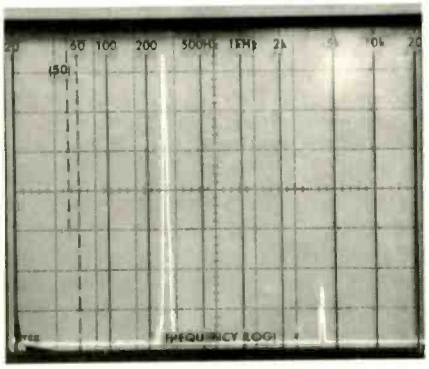


Fig. 3—Spectrum analysis of 20-kHz test signal (large spike) shows inaudible component at 40 kHz, more than 60 dB below reference level. Horizontal scale: Linear, from 0 Hz to 50 kHz.

At the lower left corner of the panel are switches which turn the player on and off manually or by an optional external timer. Additional buttons beneath the display area are labelled "Repeat" (for playing, over and over again, a single track, the entire disc, or a segment of a disc between two preselected points), "A ↔ B" (for setting those start and end points), "Time" (for toggling between an elapsed-time and a remaining-time display), "Auto Delay," and "Shuffle Play." When the "Auto Delay" button is pressed, two seconds of silence are inserted before the first selection begins. This function is toggled off by pressing the same button a second time. The "Shuffle Play" feature is an interesting one. When this button is pressed, all of a disc's selections are "shuffled" and played in random order. When all of the selections on the disc have been played once, the shuffle-play function is automatically cancelled. There would seem to be no end to what you can do with a Compact Disc player once a microprocessor is incorporated in it!

The front panel's display section presents a wide variety of useful data. When a disc has been inserted in the drawer, a "Disc" indicator illuminates. Next, a "Track" indicator briefly displays the total number of tracks on the disc, after which the actual track number being played is shown. Another display indicates elapsed time of track play after first indicating total time on the disc. (Remaining time can be toggled alternately with elapsed time, as described above). A "PGM" (ProGraM) indicator lights up when the player is in standby mode for programmed play, and an "Index" indicator shows the index number of the selection being played. (If the disc is not divided into index segments, "Index" will illuminate with the numeral "1" at all times.) The previously described numeric grid shows how many selections are programmed and which one is currently being played. If you program more than 18 selections, the word "Over" lights up.

A headphone jack at the lower left and a variable output level control at the lower right complete the CDP-620ES's front-panel layout.

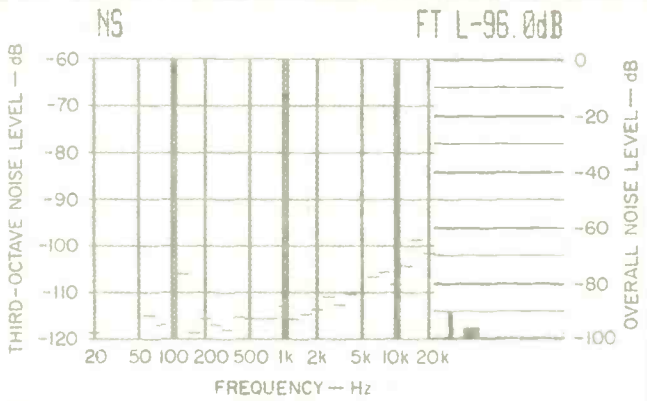
A full-function wireless "Remote Commander" control module duplicates just about every function on the front panel, including random-access programming, all the repeat-play features, shuffle play, and even remote adjustment of output level for the variable-output jacks. Interestingly, when you perform the latter adjustment remotely, you can see the control knob on the panel revolve in response to your commands!

The player's rear panel has both fixed- and variable-level output jacks, plus the multiple-pin connector intended for future link-up to that video-graphics interface module referred to earlier. The rear panel also has an initializing switch which allows you to choose which play mode (continuous, single-selection or programmed) the unit will be in when first turned on.

Measurements

Sony claims that the circuitry of the CDP-620ES is virtually identical to that found in the more expensive CDP-650ESD. My own measurements suggest that if that is indeed the case, then some variations of measured performance occur even when "uniform" sophisticated LSI chips are used to do

Time after time, the unit found and began to play requested tracks almost before I could look up from the remote control I was using to instruct it.



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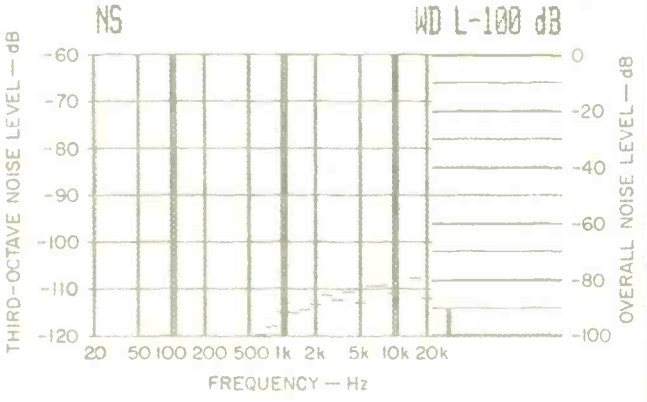

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Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

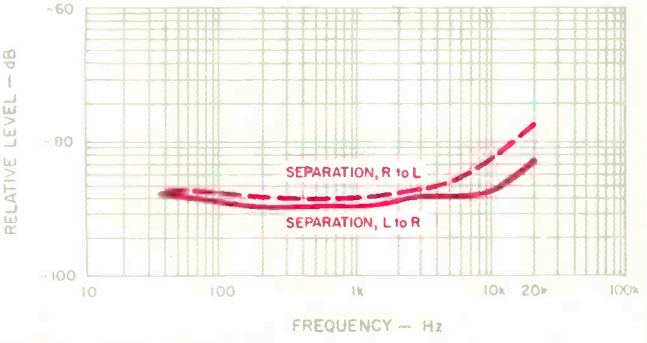


Fig. 5—Separation vs. frequency.

most of the signal processing and amplification. While the CDP-620ES's frequency response was every bit as flat as that of the more expensive Sony model (see Fig. 1), and in fact varied by no more than ±0.1 dB over the entire range of measurement from 20 Hz to 20 kHz, total harmonic distortion was ever so slightly greater. At 0 dB it measured 0.0038% at mid-frequencies. I'd say that's nothing to get upset about, but it is, nevertheless, higher than the 0.003% I measured for the CDP-650ESD. Total harmonic distortion at mid-frequencies and other frequencies, at three playback levels, is shown in Fig. 2.

I noted no out-of-band "beats" at around 24 kHz when I used a spectrum analyzer to sweep from 0 Hz to 50 kHz (linearly) while a 20-kHz signal was being reproduced by the player. This is due in part to Sony's new digital filter and oversampling approach, introduced in several of their third-generation players, and also in part to their use of a single master digital clock (the timing circuit that synchronizes everything to the 44.1-kHz sampling rate of the standard Compact Disc).

What did show up, however, was a second-order distortion component way out at 40 kHz; such a component was not visible or detectable when I measured the CDP-650ESD. Of course, since this component is at 40 kHz and its amplitude is down more than 60 dB compared with the fundamental (see Fig. 3), I couldn't get too upset about it. I only mention it—and show it—to point out that the performance of this CD player, though very close indeed to that of the higher priced 650, is not identical to it.

Unweighted signal-to-noise ratio measured exactly 96 dB, as claimed, while A-weighting increased the S/N reading to exactly 100 dB (see Figs. 4A and 4B). SMPTE-IM distortion measured 0.0044% at full output level, increasing to 0.025% at a −20 dB recorded level. Twin-tone IM (using 19-kHz and 20-kHz test tones of equal level, supplied from one of my digitally produced CD test discs) measured no more than 0.003%, both at maximum recorded level and at a level of −10 dB.

Stereo separation, plotted as a function of frequency in Fig. 5, ranged from about 88 dB at mid-frequencies to around 83 dB for the left channel and 77 dB for the right channel at high frequencies. The minor difference between left-to-right and right-to-left separation is undoubtedly due to wiring layout in the chassis and differences in capacitive coupling at high frequencies.

A 1-kHz square wave reproduced by this new CD player is shown in Fig. 6. As far as I could tell, the waveshape was identical to that obtained from the CDP-650ESD. Specifically, the shape was indicative of digital filtering and two-times oversampling, which are the methods used by a majority of late-model CD players. Reproduction of the unit-pulse signal, shown in the photo of Fig. 7, was also identical to that obtained from the Sony CDP-650ESD and other late-model CD players.

In Fig. 8, the usual display of a 200-Hz signal from the left-channel output and a 2-kHz signal from the opposite channel output shows no detectable phase shift. As you can see, the low-frequency and higher frequency sine waves cross the zero axis in a positive-going direction at the same time, as they should.

Except for access to the digital audio code, the CDP-620ES offers the same quality sound and almost all the features of its higher priced sister.

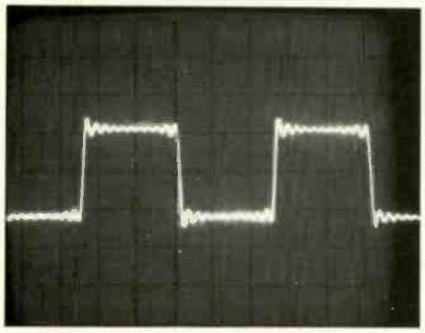


Fig. 6— Square-wave reproduction, 1 kHz.

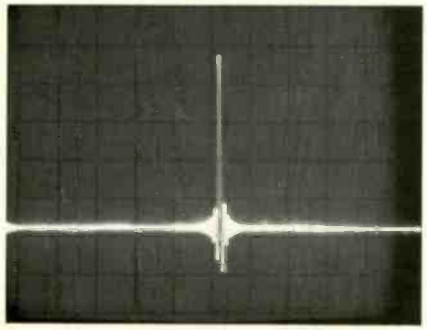


Fig. 7— Single-pulse test.

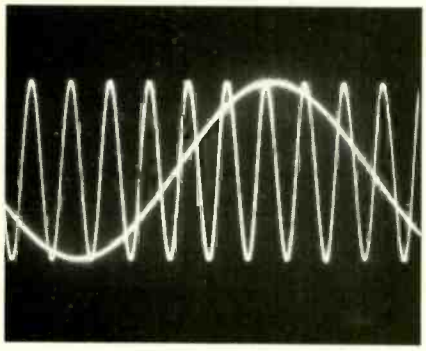


Fig. 8— Two-tone phase-test signal (200 Hz and 20 kHz).

Use and Listening Tests

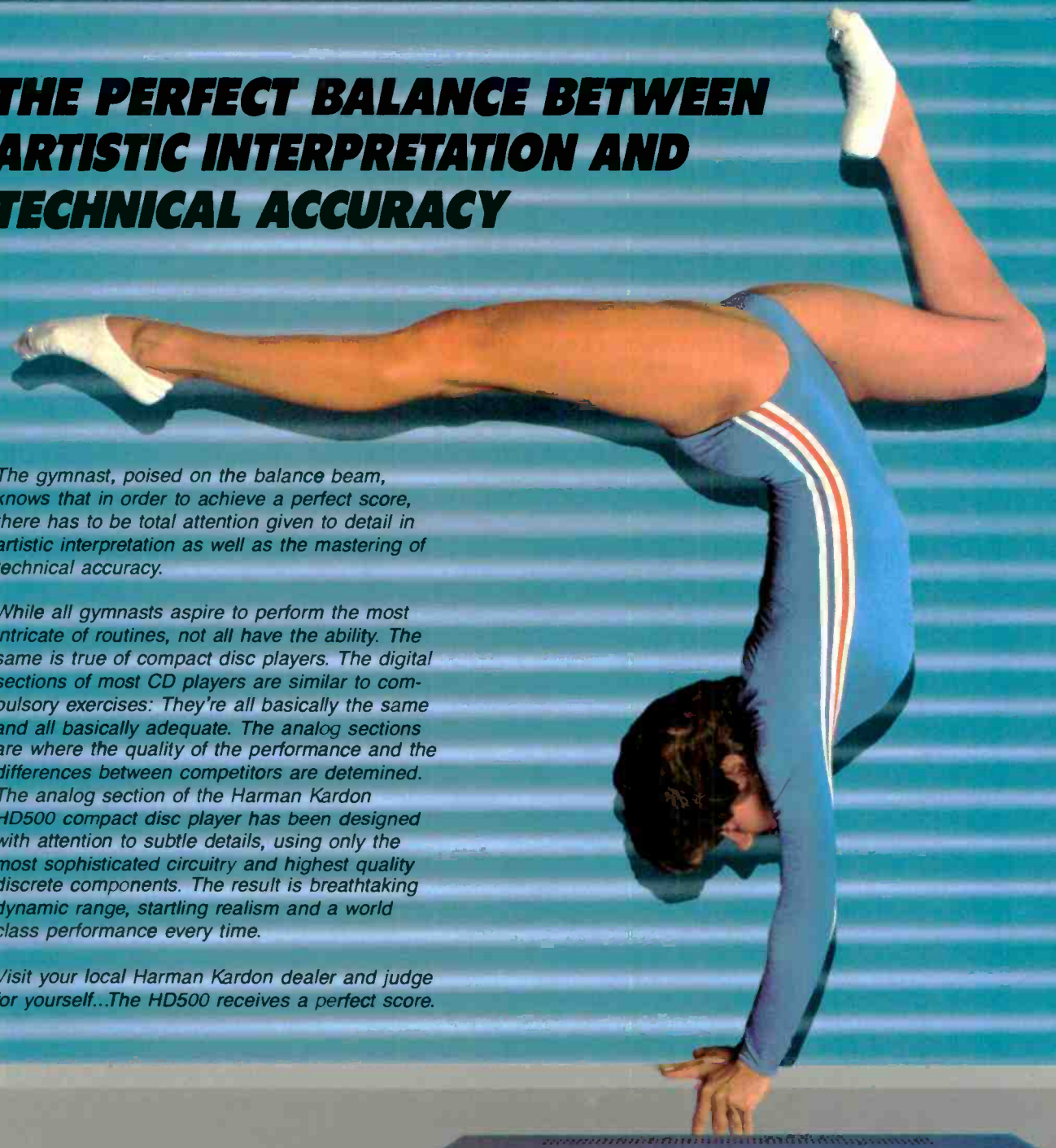
I was just as amazed by this player's speed of access as I had been by that of the CDP-650ESD. When Sony tells you that these machines can access any given point on a CD within 1 S, that is no exaggeration. Time after time, using test discs that have many more tracks than are likely to be found on musical CDs, I called upon the machine to search for double-digit-numbered tracks; almost before I could look up from the hand-held remote control I had used to enter those instructions, music of the requested track began to play. The lower mass pickup and the linear-motor pickup drive designed for the third-generation Sony CD players have been used in this latest model too, with superb results not only in terms of search speed but in terms of tracking stability and lack of susceptibility to external shock and vibration. It almost goes without saying that the "defects" disc I use to evaluate error correction and tracking ability posed no real challenge for the CDP-620ES.

Of course, the really important thing about this or any other CD player is the sound quality that it delivers. I have maintained that the best sound I ever heard from any CD player came from the CDP-650ESD. I can't say that the sound of the CDP-620ES surpasses that of the CDP-650ESD, but I can tell you that after many hours of listening and comparing I could not, in all honesty, detect any difference in sound quality between the two. Since I tested the CDP-650ESD a while ago, my library of CDs has grown some more and I now have additional CDs that I think are able to separate the "very good" players from those that are plainly "superb." The CDP-620ES clearly belongs in the second category, but in so classifying it I wonder whether Sony has inadvertently outsmarted itself. Unless you have a really good reason for wanting the digital audio code available from the CDP-650ESD's external port, why on earth would you want to spend an extra $350 for the top-of-the-line model when you can get the same high-quality sound and just about all of the convenience features (not to mention that headphone output jack) in the newly introduced CDP-620ES?

Leonard Feldman

THE HARMAN KARDON HD500 COMPACT DISC PLAYER

THE PERFECT BALANCE BETWEEN ARTISTIC INTERPRETATION AND TECHNICAL ACCURACY



The gymnast, poised on the balance beam, knows that in order to achieve a perfect score, there has to be total attention given to detail in artistic interpretation as well as the mastering of technical accuracy.

While all gymnasts aspire to perform the most intricate of routines, not all have the ability. The same is true of compact disc players. The digital sections of most CD players are similar to compulsory exercises: They're all basically the same and all basically adequate. The analog sections are where the quality of the performance and the differences between competitors are detemined. The analog section of the Harman Kardon HD500 compact disc player has been designed with attention to subtle details, using only the most sophisticated circuitry and highest quality discrete components. The result is breathtaking dynamic range, startling realism and a world class performance every time.

Visit your local Harman Kardon dealer and judge for yourself...The HD500 receives a perfect score.

harman/kardon

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AKAI CD-M88 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 5 Hz to 20 kHz, ±0.5 dB.
THD: 0.005%.
Dynamic Range: 90 dB.
S/N Ratio: 90 dB.
Number of Programming Commands: 16 (see text).
Channel Separation: 85 dB.
Line Output Level: 2.0 V.
Access Time: 2.6 S.
Power Requirements: 120 V, 60 Hz.
Dimensions: 13.8 in. W × 2.8 in. H × 10 in. D (35 cm × 7.1 cm × 25.4 cm).
Weight: 14.3 lbs. (6.5 kg).
Price: $499.

Company Address: 800 West Artesia Blvd., Compton, Cal. 90220.
(First published this issue)

With all of the "me too" CD players currently available, it has become difficult for a company to come up with a player offering something different from the rest. Akai, however, has managed to do just that with a new, extremely easy and logical way to program via the "Unique Program Order Selector," a main feature of their CD-M88.

The front panel of this mid-sized CD player is equipped with the usual numeric keypads for designating desired tracks and even index points within a given CD selection (if such index points have been encoded onto the disc). But, in addition, there are keys labelled "To," "And" and "Without." The addition of these extra buttons on the front panel makes for a simpler layout while adding versatility to the way in which programming can be done. Suppose you were playing a CD that had 20 tracks and wanted to hear tracks 1 through 5 as well as tracks 10 through 20 but omitting track 17. With most programmable players, you'd have to key in at least 15 individual numbers—assuming the deck was able to accept that many individual instructions. With the Akai CD-M88, you would press the following keys in the following order: "1," "To," "5," "And," "10," "To," "20," "Without," "17." Reading that back as a complete sentence, it makes perfect sense, doesn't it?

Other features of the Akai player include direct access to any given track, full-function wireless remote control, repeat play of a specified portion of a track or tracks, and repeat play of an entire disc. It is possible to have a disc repeat-play up to 99 times!

Control Layout

At the extreme left end of the front panel is the usual slide-out disc drawer. Just below are a phone jack and an unusual output-level control. Instead of being adjusted by a protruding rotary knob, this control is configured as a flush-mounted disc which has two tiny bumps on its flush surface. As your finger tip touches it, there's enough friction between your finger and the flat, flush-mounted knob to enable you to twist the disc and thereby adjust for more or less output level.

An elaborate and informative fluorescent display, also situated below the disc drawer, shows track and index numbers, time elapsed for the current track and total elapsed time from the beginning of a disc. In addition, all programming instructions are displayed as they are entered, including the novel "To," "And" and "Without" designations as well as "Repeat" notations when applicable. A "Display Select" button adjacent to the display area is used to choose the various track or time displays in sequence. The "Power" on/off and the disc drawer "Open/Close" switches are near the center of the front panel, while further to the right are the disc operating controls: "Play," fast forward and reverse, and "Pause/Reset" (stop). Bridging the first three controls is an unusual acronym—"IPLS"—which took a fairly careful search in the owner's manual to locate. On page 12 I finally discovered that it stands for "Instant Program Location System," by which Akai means that the beginning of the previous, the current or the next selection on the disc being played can quickly be selected by pressing the play button simultaneously with either reverse or fast forward. This method of advancing or reversing

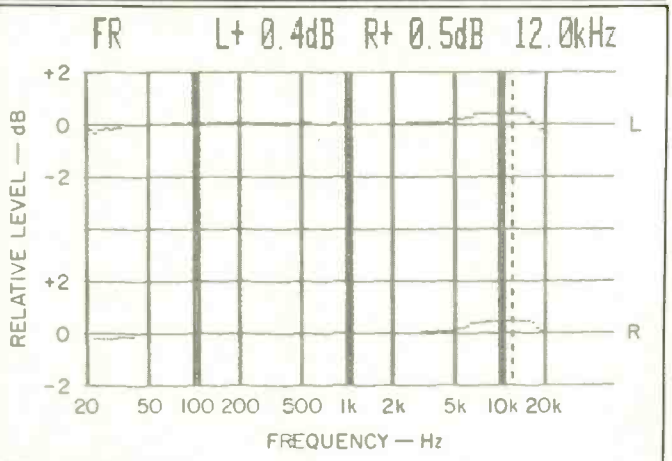


Fig. 1—Frequency response, left (top) and right channels.

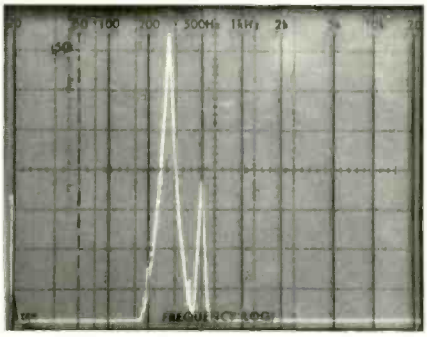


Fig. 2—Frequency sweep from 0 Hz to 50 kHz shows "beat" output at 24.1 kHz to the right of 20-kHz signal.

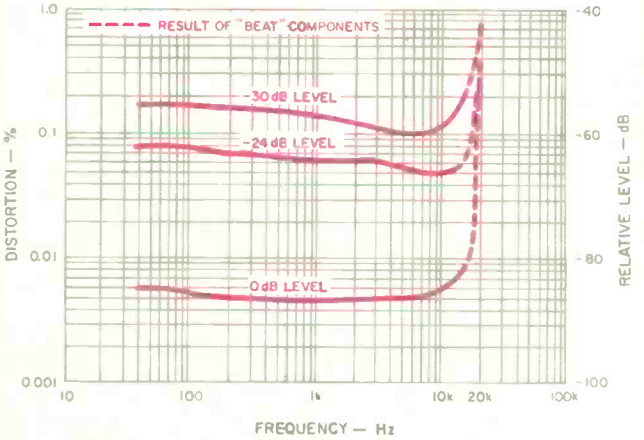


Fig. 3—THD vs. frequency at three signal levels. (High-frequency dashed lines indicate super-audible beats; see text.)

Akai's CD-M88 uses an analog filter at the output of its D/A converter, rather than the digital filter used by most of the second- and third-generation units.

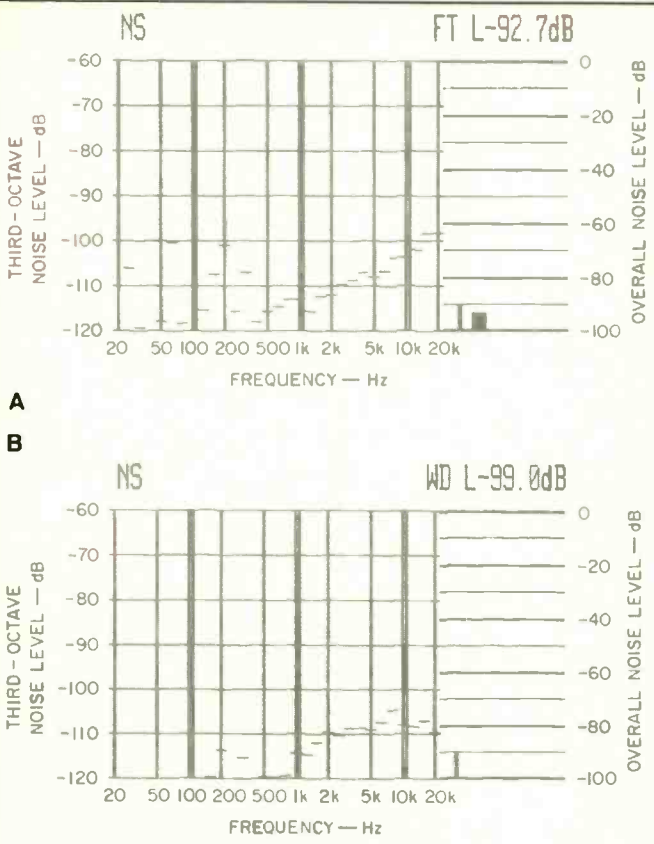


Fig. 4—S/N analysis, both unweighted (A) and A-weighted (B).

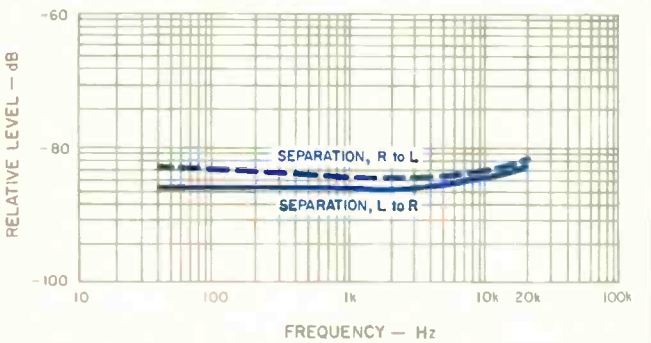


Fig. 5—Separation vs. frequency.

the laser pickup, though unusual, reduces the number of front-panel controls, an important consideration for a CD player in the mid-sized category.

All of the remaining touch controls at the right end of the panel are involved with programming for specific play routines. Here are found the numeric keys as well as the repeat key, the index key, and those special "To," "And" and "Without" keys. The routine needed to get to a specific track at the beginning of play is a little unusual. Instead of just keying in the track number and then (perhaps) pushing the play button, you treat this request as if it were part of the Akai's programming routine, first keying in the desired track and then pressing the separate "Program Start" button. Having become accustomed to the other approach, which is used on most machines, this took a little getting used to. On the other hand, when doing multiple-programming of tracks, the more-logical routine of the Akai's special word keys more than made up for the differences in the CD-M88's single-track access procedure.

Measurements

Frequency response of the Akai CD-M88, shown in Fig. 1, was flat to within the claimed ±0.5 dB over the entire audio range. A slight rise in response near the high end suggests that the steep analog filters employed after D/A conversion may not have been precisely optimized for the impedance into which they were terminated. Still, the rise amounted to no more than 0.5 dB in one channel and 0.4 dB in the other. Bear in mind that the vertical scale in Fig. 1 is only 2 dB per division.

As with so many other players, the apparent "high" harmonic distortion readings observed when checking THD of high-frequency signals (16, 19, and 20 kHz) on my test disc are not really the result of harmonic-distortion components. This is obvious if you look at the spectrum-analysis photo of Fig. 2, in which the sweep extends from 0 Hz to 50 kHz. The large spike near the left is the desired 20-kHz test-signal output, while the lower amplitude spike is a "beat" occurring at around 24.1 kHz. Figure 3 shows harmonic distortion versus frequency for three different recorded levels, but the measurement is valid only to around 10 kHz. That's why I used dashed lines above this frequency, to show that the sudden rise in apparent THD is really caused by the appearance of those out-of-band "beats."

Unweighted signal-to-noise ratio measured 92.7 dB (greater than Akai's claimed 90 dB), while the A-weighted measurement was an even higher 99.0 dB (see Figs. 4A and 4B). SMPTE-IM distortion measured 0.005% at maximum recorded level, increasing to 0.055% at −20 dB recorded level. CCIF-IM distortion (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) measured a very low 0.0028% at maximum recorded level and 0.003% at −10 dB recorded level. Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 81.4 dB at the high-frequency extreme to 85.4 dB at mid-frequencies.

Reproduction of a 1-kHz square wave by this player is shown in the 'scope photo of Fig. 6. I was surprised to discover that Akai is still using so-called analog (or sharp-cutoff, "brick-wall") filters at the output of the player's D/A

The chief attractions of this player are its great programming flexibility and that a user doesn't have to take a course to learn how to operate it.

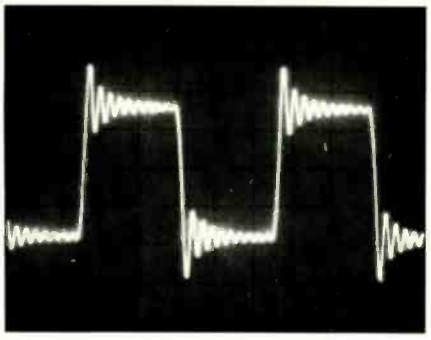


Fig. 6—Reproduction of a 1-kHz square wave.

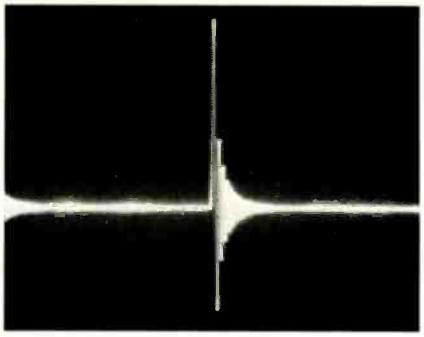


Fig. 7—Single-pulse test.

converters, whereas most other second- and third-generation CD players have gone over to digital filtering and oversampling. As I've stated on several occasions, many listeners will probably be unable to tell the difference between these two approaches, but there are those who do prefer the digital filtering approach and can hear a slight improvement in sound quality when it is used. The appearance of the unit pulse in Fig. 7, as reproduced from the Philips test disc, further confirms the use of analog filtering in this player's D/A circuitry.

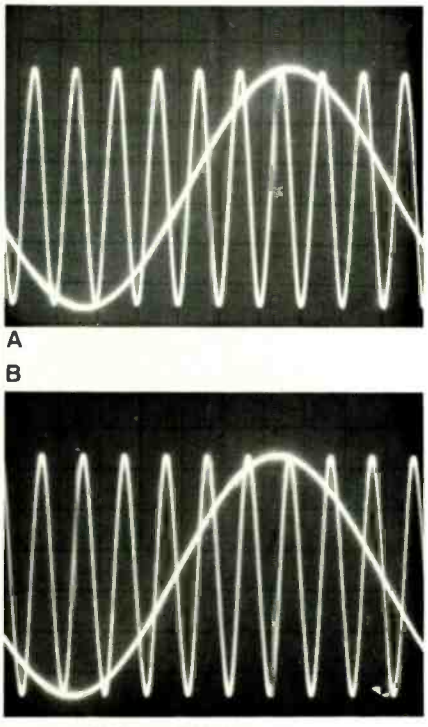
As is true of most recent CD players, the Akai unit had no trouble tracking through the simulated-defects disc. The CD-M88 totally ignored the widest portion of the opaque wedge inscribed on that disc as well as the increasingly wide "dust" specks and the simulated fingerprint smudge. Resistance to mild vibration and external shock was even more gratifying, for the unit continued to play without missing a beat every time it was tapped on its top or sides. The smaller size of this player seems to make for a sturdier and more shock-resistant housing.

Use and Listening Tests

The Akai CD-M88 is a pleasure to use. Programming is easy and logical, whether performed at the front panel or by means of the wireless remote control (which duplicates all of the programming and disc-transport controls). As for sound quality, if it didn't quite measure up to the level of more expensive CD players or those that use digital filtering and oversampling, it was certainly acceptable.

The chief attractions of this model, to my mind, are its great programming flexibility and the fact that a user doesn't have to take a long course to learn how to operate it. At a suggested retail price of just under $500, this Akai CD player should find favor with many music lovers who aren't as interested in technical circuit details as they are in functional integrity and good human engineering.

Leonard Feldman



A

B

Fig. 8—With a 200-Hz signal on left channel and a 2-kHz signal on right (A), little or no phase shift is observed. Using 2- and 20-kHz signals, considerable time delay is noted (B).

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PIONEER PD-9010X COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 2 Hz to 20 kHz, ±0.3 dB.
THD: 0.001% at 1 kHz.
THD + Noise: 0.0022% at 1 kHz.
Dynamic Range: 96 dB.
S/N Ratio: 98 dB, A-weighted.
Number of Program Selections: 32, for tracks numbered up to 99.
Channel Separation: 95 dB at 1 kHz.
Line Output Level: 2.0 V.
Power Consumption: 120 V, 60 Hz, 18 watts.
Dimensions: 18 in. W × 3.7 in. H × 12.2 in. D (45.6 cm × 9.5 cm × 31 cm).
Weight: 12 lbs., 8 oz. (5.7 kg).
Price: $539.95.
Company Address: P.O. Box 1760, Long Beach, Cal. 90801.
(First published this issue)

Pioneer's top CD player is also its most versatile and feature-laden. Supplied with a wireless, 13-function remote control, the PD-9010X can be programmed from the comfort of your armchair for up to 32 randomly accessed tracks on a disc—and the track numbers programmed can extend up to 99! In addition to the usual line output, this player is equipped with a stereo headphone jack and a headphone level control, both conveniently located on the front panel. To keep the panel simple and uncluttered, Pioneer has elected to place the programming number keys on the remote control only. In other words, you cannot program the unit from the front panel. You can, however, play discs in the normal fashion using front-panel buttons and controls. Fast search and fast advance or reverse of the pickup from track to track is possible, and you can access a given point on a disc by its index number—if the disc is so coded—from both the front panel and the remote-control unit. Index numbers cannot be included in any random programming, however.

Control Layout

The "Power" on/off switch, headphone level control, and stereo phone jack are located at the left of the front panel. The slide-out disc tray to their right can be opened and closed using the "Open/Close" pushbutton just to its right; the compartment can also be closed by gently pushing the front of the tray when a disc is in place. Two small indicator lights below the drawer show when a disc has been loaded and when a remote-control command has been received by the remote sensor on the front panel.

The elaborate fluorescent display area is immediately to the right of the disc tray and its "Open/Close" switch; it provides no fewer than 11 separate status indications. These include track and index numbers; minutes and seconds of total time, time remaining or elapsed time; play, pause, and repeat-play modes; indication of whether a disc has been properly loaded, and acknowledgment of commands from the remote control.

In addition to the large numerals that display the current track being played, there are 15 small numerals arranged in a row below the main display. These illuminate to show total number of tracks on the disc. If a disc contains more than 15 tracks, an arrow pointing to the right illuminates to indicate that fact.

Near the right-hand end of the panel are "Play" and "Pause" buttons. Along the panel's lower edge are a "Time" key (which toggles the time display), a "Repeat" key, forward and reverse "Index Search" keys, forward and reverse "Manual Seach" keys, a pair of track-advance and track-reverse keys, and a "Stop/Clear" key to discontinue play as well as to clear the memory of programmed instructions.

The hand-held remote-control unit supplied with the PD-9010X duplicates most of the function keys described above. It is also equipped with the "0" to "9" number keys and the "Program" key needed for random-access programmimg.

Measurements

Frequency response of the PD-9010X is shown in Fig. 1. Response was very slightly attenuated at 20 kHz, measuring

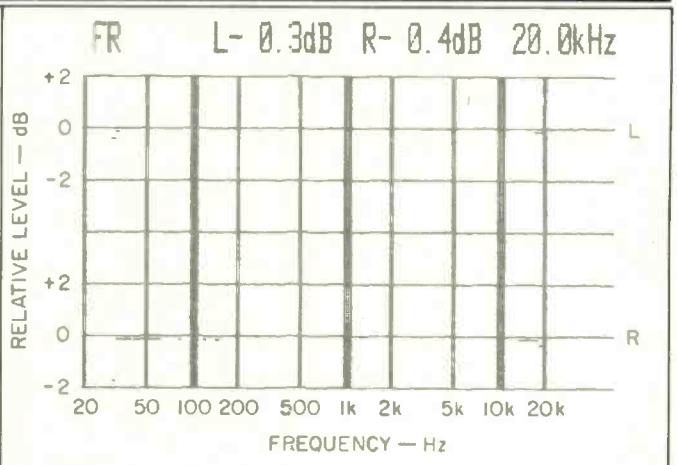


Fig. 1—Frequency response, left (top) and right channels.

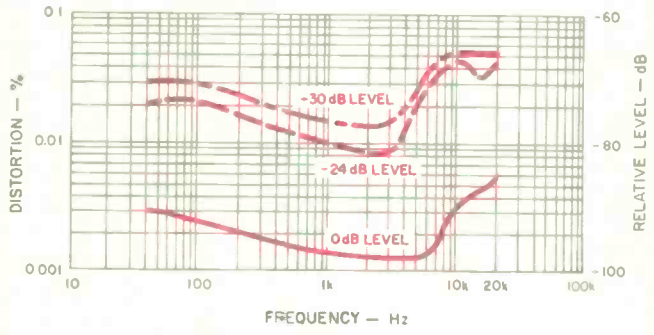


Fig. 2—THD vs. frequency at three signal levels.

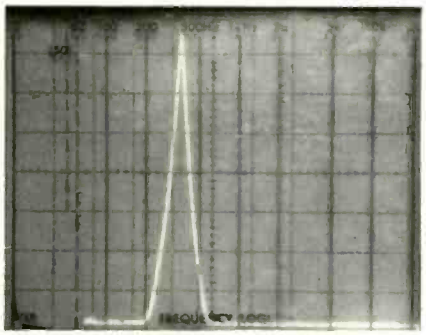
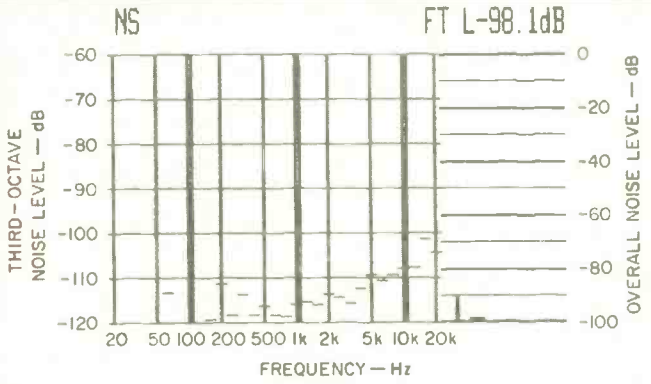


Fig. 3—Spectrum analysis of 20-kHz test signal; output was 20 kHz, and nothing else!

The harmonic distortion produced by this unit was truly negligible, and its output at 20 kHz was totally clean.



A

B

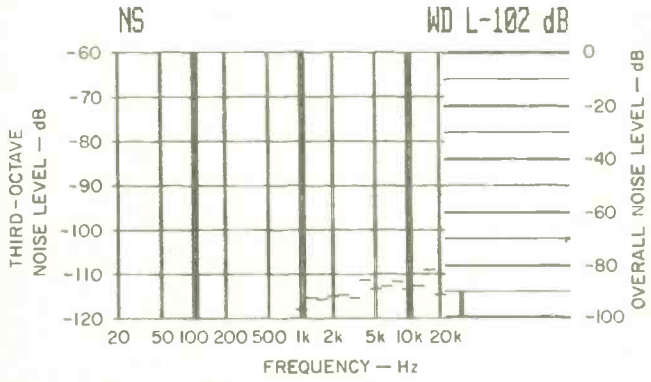


Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

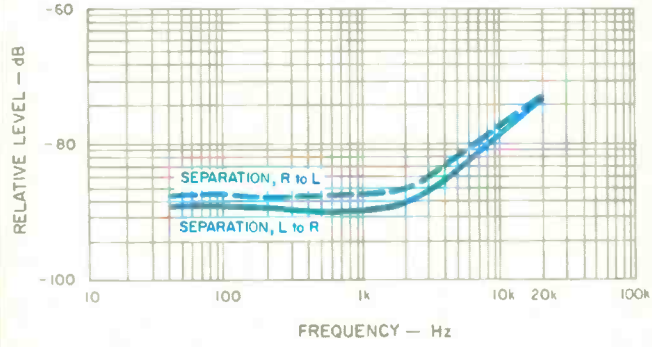


Fig. 5—Separation vs. frequency.

−0.3 dB for the left channel and −0.4 dB for the right channel. As usual, in order to plot frequency response deviations in greater detail, the vertical scale in Fig. 1 is only 2 dB per division.

The harmonic distortion produced by this well-designed unit was truly negligible. Unlike almost every other CD player I have tested in the past two years, this one did not produce any significant "beats" at out-of-band frequencies. As a result, it was not necessary to introduce a band-pass filter when making the measurements. The values plotted in Fig. 2 are the actual values read by my distortion analyzer in its wide-band mode, and the three curves are valid all the way up to 20 kHz. Cutoff of the analyzer, when used in the wide-band mode, is at 80 kHz, so if there were any out-of-band components of significance, they would have contributed to and increased the readings. Under these test conditions, THD at 1 kHz was an incredibly low 0.0015%, well below Pioneer's claimed 0.0022% for THD + noise.

Figure 3 confirms the fact that no out-of-band beats were present when the PD-9010X reproduced high frequencies. The tall spike in this spectrum analysis represents a 20-kHz test signal; as you can see, there are no other components visible. The only other CD player I ever tested that exhibited such totally clean output at 20 kHz was Sony's top-of-the-line CDP-650ESD, which has a suggested price more than twice that of the Pioneer PD-9010X.

Unweighted signal-to-noise ratio measured 98.1 dB; the A-weighted measurement was a very high 102 dB, 4.0 dB higher than claimed by Pioneer (see Figs. 4A and 4B). SMPTE IM measured 0.003% at maximum recorded level, increasing to 0.025% at −20 dB recorded level. CCIF IM (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was an extremely low 0.0037% at maximum recorded level and an even lower 0.0028% at −10 dB recorded level.

Stereo separation, plotted in Fig. 5 as a function of frequency, ranged from 73.0 dB at the high-frequency extreme to 90.0 dB at mid-frequencies.

Reproduction of a 1-kHz square wave is shown in Fig. 6. The reproduced wave shape is typical of that produced by CD players which employ oversampling and digital filtering. The unit pulse in Fig. 7, as reproduced from a Philips test disc, is also consistent with what I have obtained with other players that employ this type of filtering and oversampling. The apparent inversion of the waveform is not our photo editor's mistake. Evidently, phase inversion occurs somewhere in this player's signal chain, as it has in a few other units I have tested. So long as this inversion is the same in both left and right channels, there is no problem.

In checking for phase error, I detected no difference in the positioning of a pair of low- and mid-frequency test tones (200 Hz and 2 kHz) on opposite channels compared with the positioning of a pair of mid- and high-frequency signals (2 and 20 kHz). I concluded, therefore, that in addition to its many other sonic virtues, the Pioneer PD-9010X is virtually free of any phase or time-delay errors commonly associated with analog output filters.

As I expected, the Philips defects disc was unable to trip up the excellent tracking and error-correction capabilities of this CD player. As has been true of nearly all of the third-

NEC's digital experience here...

brings you a better digital experience here.

When you put a satellite in orbit, you want every possible assurance that it will perform. That's why corporations and governments all over the world ask NEC to build their satellites.

Even if you don't launch objects into outer space, it's comforting to know that NEC puts much of our satellite PCM digital technology into our Compact Disc players for the home.

While most high fidelity companies have only two or three years of experience with PCM digital audio, NEC has been at it since 1965. So it comes as no surprise that other manufacturers are now imitating the digital filtration and high-speed switching our CD players have had from the beginning. And it's no surprise that independent critics in America, Europe and Japan have awarded NEC's players top ratings.

You see, building satellites is not enough for NEC. We feel obligated to take the world's most advanced technology one step further. Into your home.

NEC

We bring high technology home.

NEC Home Electronics (U.S.A.), Inc., 1401 Estes Avenue, Elk Grove Village IL 60007

I can't think of any programming or display features that have not been included on this superb-sounding player.

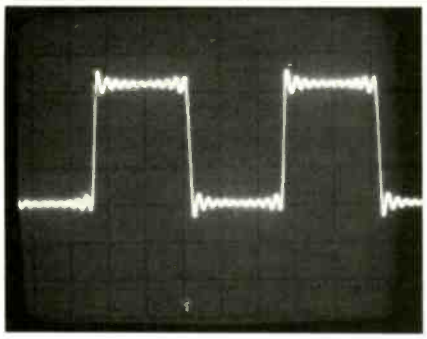
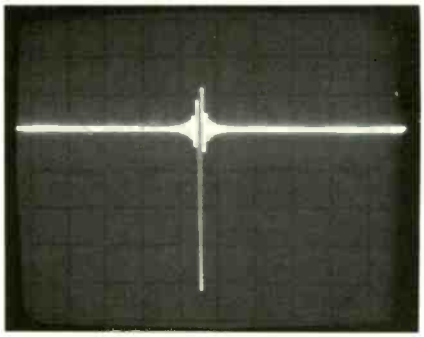


Fig. 6— Reproduction of a 1-kHz square wave.

Fig. 7— Unit-pulse test.



generation units I have been evaluating lately, this one had no trouble playing right through the simulated scratch (up to 900 microns in width), the simulated dust circles (up to 800 microns in diameter) and the simulated fingerprint smudge which extends over two complete musical tracks of the test disc. Resistance to mild vibration and external shock was especially good. The PD-9010X continued to play with no audible interruptions, skipping, or disc rejection while I repeatedly subjected it to less-than-gentle tapping along its top and sides. The folks at Pioneer have advised me that part of this stability comes from the player's unique internal suspension system. Pioneer has apparently gone to great pains to make certain that the PD-9010X will play through discs under a variety of difficult conditions.

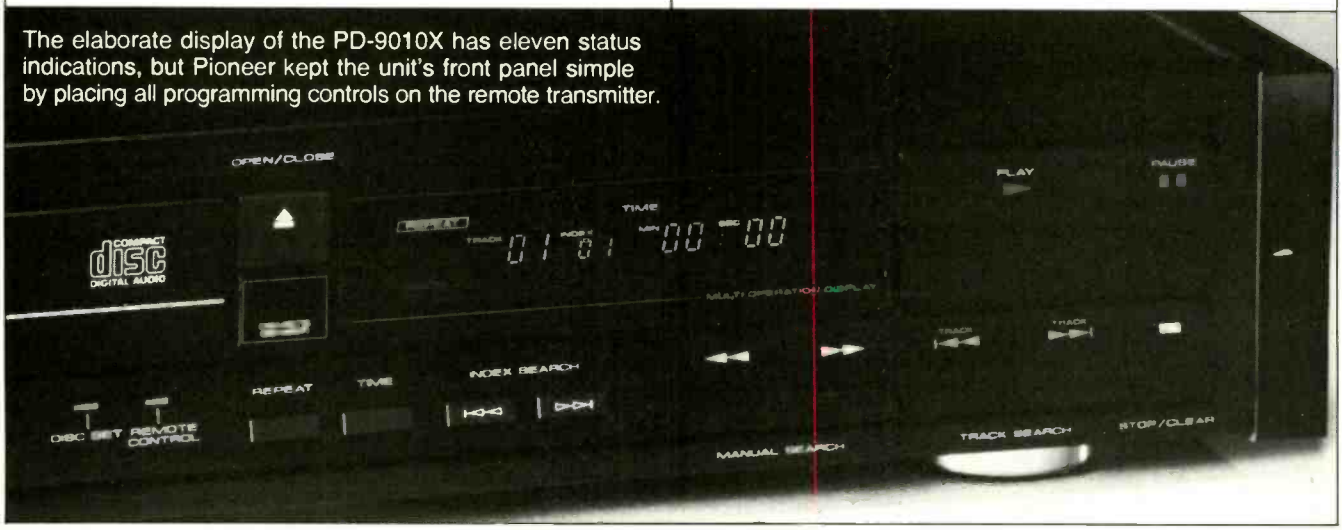
Another example of the care Pioneer has taken is the special disc-retaining surface which engages CDs when the machine is in the play mode. Most disc-retaining surfaces simply grab the disc near its center hole. In the PD-9010X, nearly three-quarters of the surface of a disc is supported while being played. You can imagine how much this will help when trying to track moderately warped CDs!

Use and Listening Tests

My initial reaction to the PD-9010X was to object to the fact that I could not program the player at its front panel but had to use the remote control. I felt this way even though I realized that Pioneer achieved two worthwhile objectives with this approach: Lower cost (since they didn't have to duplicate the number keypad and its associated circuitry on the panel) and a less cluttered appearance. After using the player for a few days, my initial objections simply disappeared. More often than not, I found myself loading a disc and then, with the remote in hand, sitting down across the room to program what I wanted to hear—with the disc's "jewel box" package and album booklet alongside my chair. I realized, too, that if I desired to program the machine at its front panel, there would be nothing to stop me from simply keeping the full-function remote control alongside or on top of the player.

Such minor considerations aside, let me get to the important things. In a word, the Pioneer PD-9010X is one of the most value-laden CD players it has been my pleasure to evaluate so far. I can't think of any programming or display features which have been omitted that a user might require. All of those convenience features wouldn't be worth much, however, if the player lacked good sound-reproduction capability. Not only is this player a superb-sounding instrument, but Pioneer has somehow managed to put all of these desirable qualities together in a unit that sells for a price that more music lovers than ever will be able to afford. I'll bet the competition is tearing apart several PD-9010Xs right now trying to find out how Pioneer did it! *Leonard Feldman*

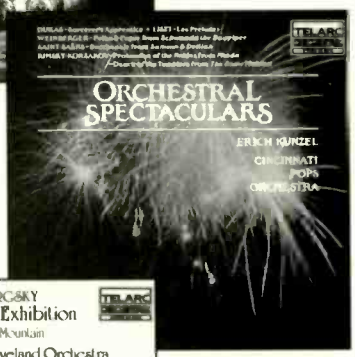
The elaborate display of the PD-9010X has eleven status indications, but Pioneer kept the unit's front panel simple by placing all programming controls on the remote transmitter.



IS YOUR HARDWARE

READY?

IS YOUR HARDWARE READY?



TITLE	CD NUMBER
HOLST / HANDEL / BACH • Fennell / Cleveland Symphonic Winds	CD-80038
STRAVINSKY: Firebird Suite • **BORODIN:** Polovtsian Dances • Shaw / Atlanta	CD-80039
Malcolm Frager plays **CHOPIN** • Bösendorfer Imperial Grand	CD-80040
TCHAIKOVSKY: *1812* Overture / Capriccio Italien • Kunzel / Cincinnati	CD-80041
MOUSSORGSKY-RAVEL: Pictures at an Exhibition / Night • Maazel / Cleveland	CD-80042
TCHAIKOVSKY: Symphony No. 4 in f, Op. 36 • Maazel / Cleveland	CD-80047
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BEETHOVEN: The Five Piano Concertos • Serkin / Ozawa / Boston (3 CD)	CD-80061-5
BEETHOVEN: Piano Concerto No. 3 / "Choral" Fantasy • Serkin / Ozawa / Boston	CD-80063
BEETHOVEN: Piano Concertos No. 2 & 4 • Serkin / Ozawa / Boston	CD-80064
BEETHOVEN: Piano Concerto No. 5 "Emperor" • Serkin / Ozawa / Boston	CD-80065
SHOSTAKOVICH: Symphony No. 5, Op. 47 • Maazel / Cleveland	CD-80067
TCHAIKOVSKY: Romeo & Juliet / Nutcracker Suite • Maazel / Cleveland	CD-80068
VIVALDI: Four Seasons • Silverstein / Ozawa / Boston	CD-80070
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Telarc Compact Disc Sampler, Vol. I	CD-80101
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California Project (Surfin' Music) • Papa Doo Run Run	CD-70501

COMPACT disc DIGITAL AUDIO

TELARC DIGITAL

13

ALPINE 5900 CAR STEREO COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 5 Hz to 20 kHz, ±1.0 dB.
THD: 0.005% at 1 kHz.
Dynamic Range: 90 dB.
S/N Ratio: 90 dB, A-weighted.
Channel Separation: 85 dB at 1 kHz.
Tone Control Range: Bass, ±10 dB at 100 Hz; treble, ±10 dB at 10 kHz.
Line Output Level: 500 mV at volume-control center.
Power Requirements: 14.0 V d.c. (11 to 16 V allowable).
Dimensions: Chassis, 7 in. W × 2 in. H × 5½ in. D (17.8 × 5 × 14 cm); nose piece, 6¾ in. W × 1⅞ in. H × 9/16 in. D (17.1 × 4.8 × 1.5 cm).

Weight: 3 lbs., 15 oz. (1.8 kg).
Price: $600.
Company Address: 19145 Gramercy Pl., Torrance, Cal. 90501.
(First published this issue)

The Alpine 5900 CD player is designed to connect between a car's radio/tape player ("head unit") and an amplifier. It can also be used without a head unit, if CD is all you want to hear in your car. The 5900 will probably be used most often with external amplifiers, though it can also be used with the amplifiers built into some Alpine head units.

When the 5900 is not playing, the head unit's signal passes through it and appears at the player's outputs. When it is in play mode, the signal from the CD appears at its outputs, and the player's volume, bass and treble controls take effect. When the player is used with some Alpine head units (such as the 7273 and 7374), the head unit's display shows when a CD is playing, and, if a tape had been running, the unit goes into tape pause mode. If the 5900 is used with head units that lack this pause feature, Alpine recommends ejecting any tape that might be playing before switching over to CD play, so the tape will not keep running.

As I soon discovered during my tests of this trim little unit, it is easiest to connect to Alpine head units and amplifiers, which have matching DIN connectors that latch securely. Alpine makes DIN-to-RCA adaptors available for connections to other brands of head units (part number 4308) and amplifiers (4853). For connection to components which do not have RCA connections, you may have to cut off the DIN

Considering its small size, the Alpine 5900's features come close to matching those on home CD players.

plugs supplied on the 5900 and figure out which wires in the cable end go where.

Considering its small size, the Alpine 5900's features come pretty close to matching those found on home CD players. There's no random direct access, but it's easy enough to push one of the music sensor buttons (marked with upward- and downward-pointing arrows) several times in succession to move ahead or back by several tracks. You can move ahead or backward on individual tracks, and also have the unit repeat a single selection or an entire disc. "Power Loading" gently takes a disc from your hand as you insert it in the narrow slot on the front of the player, completing the disc-loading operation smoothly and correctly so you can concentrate on driving. To further aid you in keeping your eyes on the road, the 5900 responds to all commands or buttons pressed by sounding a beep. If this becomes annoying, there are easy ways to turn the acknowledgment beep off—and back on, if you decide you want it after all.

Control Layout

At the extreme left of the player's front panel are concentrically mounted, detented volume and balance controls. Just beneath them are smaller, detented bass and treble controls. The incorporation of these four controls makes it possible to use the CD player as a "stand-alone," with its output signals fed directly to a power amplifier if you choose to do so. Once set, both of the tone controls can be pushed in so that the knobs are flush with the panel, and their settings will not accidentally be changed. Pushing them a second time causes the knobs to protrude again when you need to reset them.

The rest of the front panel contains the narrow CD slot and, below it, the digital display and the remaining pushbuttons. These include a "Repeat" button (push it once to repeat the current track, twice to repeat the entire disc), the two "M. Sensor" (Music Sensor) buttons, the fast-forward ("Fwd") and fast-backward ("Bwd") butfons, a disc "Eject" button, a "Play/Pause" button that is toggled between these two modes by successive pressing, and a "Display" button which changes the numeric display from track number to elapsed time of the currently playing track. A button labelled "ADI" (for Auto Disc Initializer) performs the function that I normally associate with the word "reset"; it returns the pickup to the beginning of the disc and either re-initiates play (if you are in that mode) or remains in the pause mode. "Play," "Pause," and "Repeat" appear as illuminated words in the display area.

Measurements

My tests of the Alpine CD player were conducted entirely on the test bench, where I powered the unit with a constant, regulated d.c. supply voltage of 14.0 V, as specified. (Technical Editor Ivan Berger, who has operated an identical unit in his car, will follow with some comments concerning this unit's actual performance on the road.) When I concluded my tests, I did vary the supply voltage to see what would happen: During stationary listening tests, the player performed perfectly so long as the supply voltage did not go below 11.5 V.

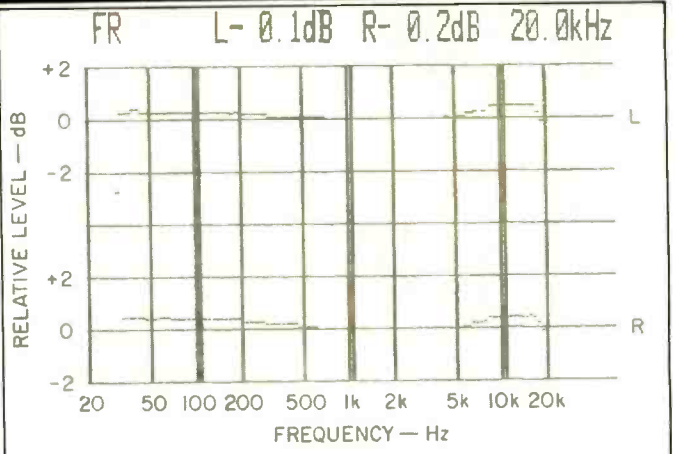

Fig. 1—Frequency response, left (top) and right channels.

Frequency response of the 5900, shown in Fig. 1, was flatter than claimed, with a maximum deviation of only ±0.3 dB over the entire audio range. A slight rise in response near the high end was typical of the response I have found in CD players that employ steep analog filters after D/A conversion. The rise amounted to no more than 0.5 dB in one channel and 0.4 dB in the other. Bear in mind that the vertical scale in Fig. 1 is only 2 dB per division.

As with many a.c.-operated home players, the apparent "high" harmonic distortion readings observed when checking THD of high-frequency signals (19 and 20 kHz) on my test disc are not really the result of harmonic distortion components. Rather, these high readings are the result of out-of-band "beats" which, though inaudible, cause the distortion analyzer to yield the figures which I recorded. Figure 2 shows harmonic distortion versus frequency for three different recorded levels, but the curves are valid only to around 16 kHz. The short-dash lines above this frequency show the sudden rise in THD caused by the out-of-band beats.

Unweighted signal-to-noise ratio, shown in Fig. 3A, measured 88.2 dB. With an A-weighting network, S/N measured 92.7 dB (see Fig. 3B), greater than Alpine's claimed 90 dB. SMPTE IM was 0.003% at maximum recorded level, increasing to 0.02% at −20 dB recorded level. CCIF IM (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) measured a very low 0.0042% at maximum recorded level and 0.003% at −10 dB recorded level. Stereo separation, plotted in Fig. 4 as a function of frequency, ranged from 70.1 dB at the high-frequency extreme to 81.4 dB at mid-frequencies. I detected that some crosstalk was being caused by the proximity of the left and right conductors of the output cable, but certainly the separation figures obtained are far more than anyone would need—especially in the environment of an automobile!

Reproduction of a 1-kHz square wave by this player is shown in Fig. 5. It is obvious from this photo that Alpine is still using sharp-cutoff, "brick-wall" analog filters at the out-

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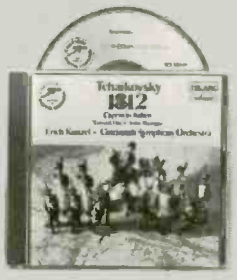

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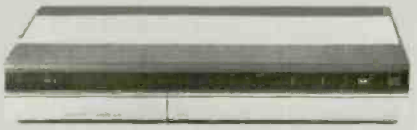

YAMAHA CDX2—**Programmable CD player with random access playback system, 3-way music search and index search function. *$299.***

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YAMAHA CD3—**Remote control CD player with advanced signal processing circuitry. *$399.***

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Nice touches abound, from an obvious one, audible fast search, to having a place where you can store the transit screw.

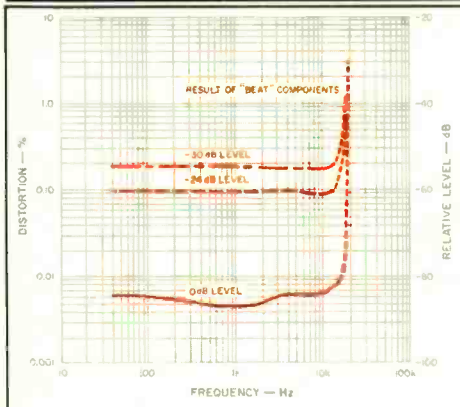
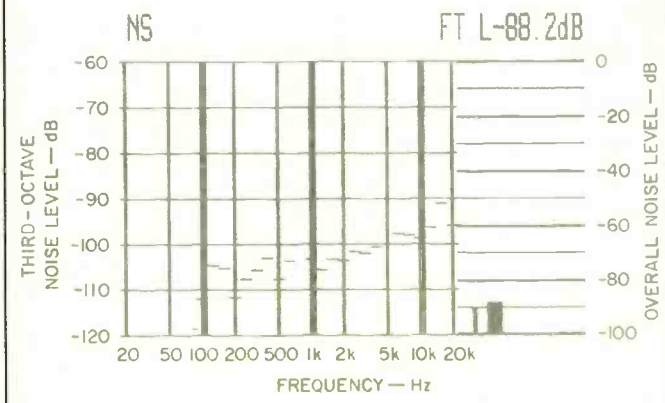


Fig. 2—THD vs. frequency, at three output levels. Dashed portions of curves (beyond about 16 kHz) are "beat" components rather than distortion (see text).



A

B

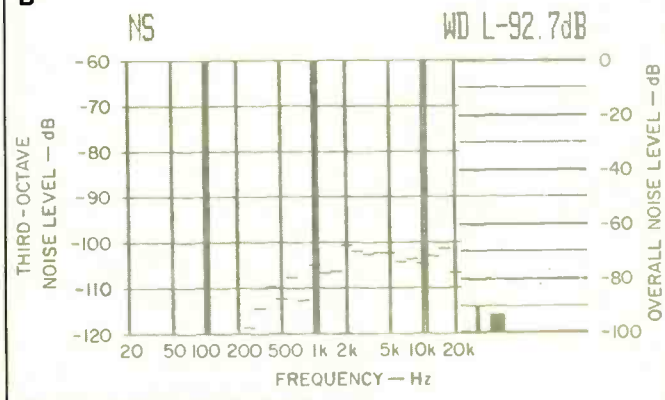


Fig. 3—S/N analysis, both unweighted (A) and A-weighted (B).

put of the player's D/A converters, whereas most other second- and third-generation CD players have gone over to digital filtering and oversampling. The appearance of the unit pulse in Fig. 6 further confirms the fact that analog filtering is being used.

The balance, bass and treble controls, though not really key to the CD player's basic functions, behaved pretty much the way you would expect them to work on any car-stereo head end. Maximum bass and treble cut and boost amounted to approximately ±10 dB, as specified by Alpine. With the balance control set at its detented midpoint, output levels from opposite channels were within 0.2 dB of each other. Tracking of the volume control was accurate to within 1 dB, down to a −50 dB level.

The 5900 had no trouble tracking through my simulated-defects disc, totally ignoring all three specially implanted defects. It was able to track through 900-micron-wide portions of a simulated opaque scratch, through 800-micron-diameter dust particles, and through a defined area of semi-opaque fingerprint smudge inscribed on the test disc. I also subjected the unit to mild tapping and vibration, but I would not equate my tests with the kind of vibration and bumping to which such a unit will be subjected when it is installed in an automobile.

Listening Tests

Such additional tests as I performed were not very relevant to use in a car. I hooked up the outputs of the CD player to the high-level inputs of my reference system—including my reference home speakers, which are obviously superior to any car speaker in their ability to reproduce bass. I did notice that, with the volume control turned up fully, maximum output at the left and right terminals was considerably higher than the usual 2.0 V I've been measuring for most CD players—it was nearly 3.5 V for a test signal recorded at maximum level on a CD. However, the player's volume control is so tapered that at its mid-setting, output is a more reasonable 0.5 V, as specified. This level is undoubtedly consistent with the levels obtained from Alpine's AM/FM cassette units.

Alpine has done a nice job in designing their first car CD player to match their other car units, aesthetically and in terms of compatibility and operating features. While the sound of the player was quite good in my home reference system, I was able to distinguish between the characteristic steep filtering used in this player and the digital filtering used in my reference home player, when comparing the sounds of some of my more recently acquired discs. I suspect this subtle difference will all but vanish in an automobile, but I'll let Ivan Berger be the judge of that.

Leonard Feldman

Behind the Wheel

About the only main control feature Len missed is the 5900's night illumination. You can't see it by day, but soft glows outline the loading slot and main controls, and even the volume-control setting. If you're using the player with an Alpine head unit, these lights go on as soon as you turn the head unit on; otherwise, only the loading-slot light (the most important light) glows, until a new disc is inserted.

The player sailed without a glitch over a range of roads, from heat-swollen concrete expansion joints to Belgian block and ragged blacktop.

The small, thin legends on the eight identically shaped controls at the panel's lower right are almost impossible to read when the buttons are illuminated, but they're also too small to read while you're driving in daylight.

Both fast-forward and fast-backward searches are audible, so you can find the passage you want without taking your eyes off the road (save for a moment, perhaps, to find the proper button). If you can look, you'll find that the display shows elapsed time within the track while the search functions are operating, even if it was in the track-number mode beforehand—a useful touch. Another nice touch is the provision of a threaded hole to hold the transit screw when the unit is in use, keeping it handy in case the player must be shipped somewhere at a later date.

One control, the reset button, is unmarked and all but invisible. (It's just to the right of the disc loading slot.) If the player fails to work, pressing this button with a ballpoint pen or similarly pointed object will usually correct the problem. I only needed to press it once, when the player was just installed—and that wasn't the player's fault so much as the photographer's. (He had left a disc inside the player when he disconnected its power.) Still, it would have been good to have this button prominently mentioned in the instructions, rather than buried in a list of controls on page 14 of the 24-page manual.

Once working, the 5900 worked well. It slurped each disc in, played it, then diffidently ejected it halfway, pulling it back into the transport for safekeeping if you didn't take it out within 15 S. Play begins as soon as you insert a disc, a great convenience; but it goes into pause mode when it's only re-ingesting a previously ejected disc.

All controls worked as they should. I did find the beep tone annoying after a while, and shut it off. It's not needed, as the effect of each control becomes audible soon enough. It would be great, though, if each of the eight buttons sounded a different tone so that you could tell by tone which one you'd pushed.

Len's guess about the 0.5-V output level is correct. In my system (currently set up for a reference Alpine 7347 head unit), I found the volume control's mid-setting just about right, most of the time.

I couldn't check Len's conjecture about the importance or unimportance of digital filtering in the car, as my first-generation home player also uses analog filtration, and because my car's system is currently in transition to something new and therefore doesn't sound exactly like what I'm used to. My installer thought the player lacked highs, and he turned the treble control up to the 3 o'clock position. I felt it was slightly shrill, and backed the treble off to 11 o'clock or so. My wife felt it sounded flat and undynamic. Nonetheless, we all agreed that it sounded better than tape or FM—by a long sight.

A critical question, for a mobile CD player, is how well it handles bumps. I did not have time to seek out speed bumps and other thank-you-ma'ams, but I did play the 5900 while driving over a reasonable range of roads, including concrete with heat-swollen expansion joints, Belgian-block paving (with occasional blocks missing) and slightly ragged blacktop. The Alpine 5900 handled them all, without a glitch.

Ivan Berger

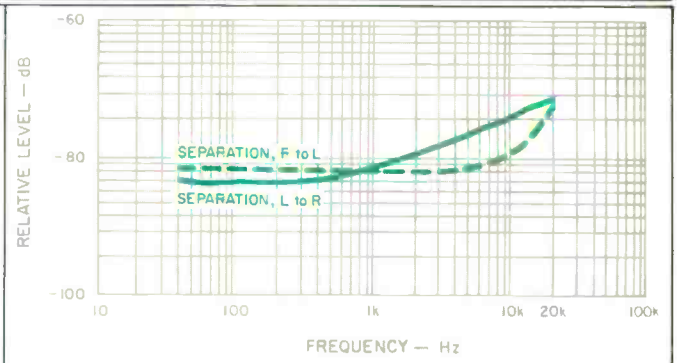


Fig. 4—Separation vs. frequency.

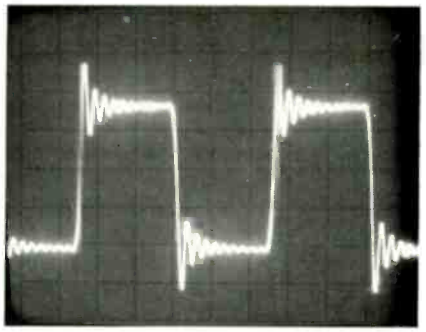


Fig. 5—Reproduction of a 1-kHz square wave.

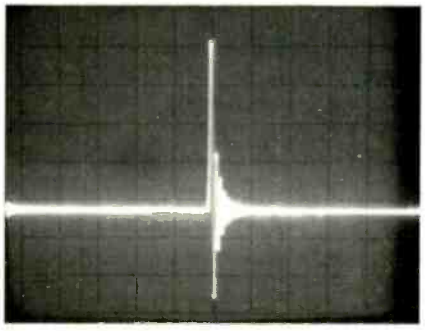


Fig. 6—Single-pulse test.

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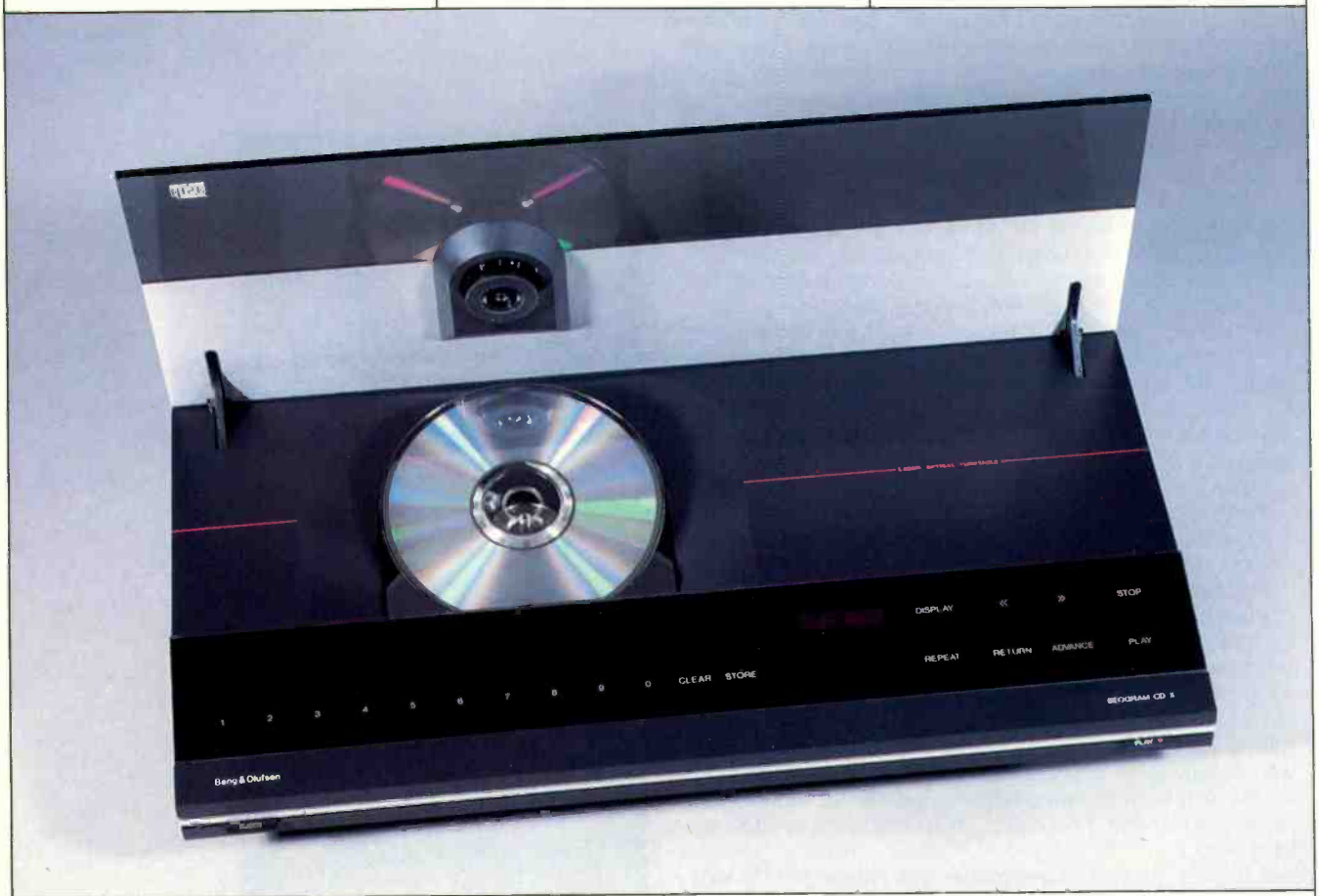
BANG & OLUFSEN BEOGRAM CD X COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 3 Hz to 20 kHz, ±0.3 dB.
Harmonic Distortion: 0.003% at 0 dB, 0.03% at −20 dB.
S/N Ratio: Greater than 96 dB.
Dynamic Range: Greater than 96 dB.
Channel Separation: Greater than 94 dB, 20 Hz to 20 kHz.
Channel Difference: Less than 0.5 dB.
Converter System: 14 bit; 176.4-kHz oversampling.
Low-Pass Filter: Digital plus analog.
Number of Programmable Selections: 40.
Output Level: 2 V rms at 0 dB.
Power Requirements: 120 V, 50/60 Hz, 25 watts.
Dimensions: 16½ in. W × 3 in. H × 12¼ in. D (42 cm × 7.6 cm × 31.1 cm).
Weight: 12.4 lbs. (5.6 kg).
Price: $699.
Company Address: 1150 Feehanville Dr., Mt. Prospect, Ill. 60056.
(First published this issue)



Leave it to Bang & Olufsen to come up with a CD player distinctly different from the morass of look-alike models appearing recently. B & O's Beogram CD X is elegantly styled to match other components made by this Danish firm, whose products grace the permanent design exhibit at New York's Museum of Modern Art. But the B & O styling goes far beyond aesthetics. Of course, the CD X is beautiful to look at and is sure to be a conversation piece in any tastefully furnished home. However, it is also one of the easiest players to use, its gently sloping, black-tinted-glass control surface inscribed with words and numerals that need only to be lightly touched to perform various operations. There are no switches, knobs, or other protrusions on the top surface of the unit. As elegant as this arrangement is, I did find that

with continued use, my fingers left marks on the polished glass surface, requiring rather frequent cleaning with a dry cloth. One gets the feeling, after a while, that this player should be approached only when wearing those white gloves that waiters sometimes wear in French restaurants.

Although the CD X has no provision for remote control, you are not likely to miss this feature, given random access to specific tracks and the amount of programmability available. You can program up to 40 commands for a given disc; since few discs contain this many actual tracks, you can ask for several tracks to be repeated.

Control Layout

"Control" is actually a misnomer here, for, as I've mentioned, the CD X has no operating controls in the traditional sense, other than an "Eject" button at the left of the narrow front surface and a "Play" button at the far right. There is also a "Play" on the control surface, with the difference that the button doubles as the on/off switch. If a disc is in place, touching either "Play" makes the CD X scan the disc, display the total number of tracks (up to 20) by a series of green numerals lighting up on the control surface, and begin play. At this point, you can program the CD X (either while the disc is playing or after pressing "Stop" on the panel) to play up to 40 tracks, in any order. Programming is begun by light touches on the control surface, just above the series of white numerals (0 through 9) which, in turn, appear just below the green numbers. Each selection is then completed by a light touch on the word "Store," just to the numerals' right. If you want to hear most, but not all, of the tracks, B & O makes this easy too: After first touching the number corresponding to the *undesired* track, simply touch the word "Clear" to eliminate that track from the playing sequence. With a disc containing many tracks, clearing or omitting one track is much easier and faster than having to store, say, 19 tracks.

If there is no disc in place when you press the "Play" button, a red question mark appears in the main display area to the right of the green or white track and programming numerals. To insert a disc, you press the "Eject" button. Three-quarters of the unit's top surface then gently lifts up, providing access to the CD turntable surface. At the same time, the turntable surface itself tilts up, almost "inviting" you to place a CD on it. Once a disc is in place, gently touching the open lid will cause it to close as quietly and as smoothly as it opened. Alternatively, touching the word "Play" on what B & O calls their "Sensi-touch" panel causes the lid to close and play to begin from the beginning of the disc.

To the right of panel center, the red LED display serves four purposes. Initially, it shows the elapsed time of the track currently playing. Touching the word "Display" replaces this with a readout of total elapsed time from the disc's beginning. Touched again, the display will show the track and index number currently being played. Finally, a question mark appearing in the display indicates that you have done something wrong and the CD X cannot follow your command. For instance, loading a disc upside down or asking for tracks that don't exist result in the question mark being displayed.

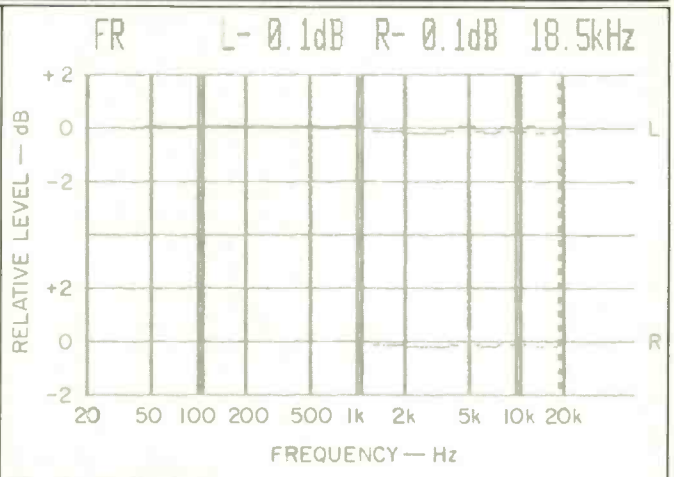


Fig. 1—Frequency response, left (top) and right channels.

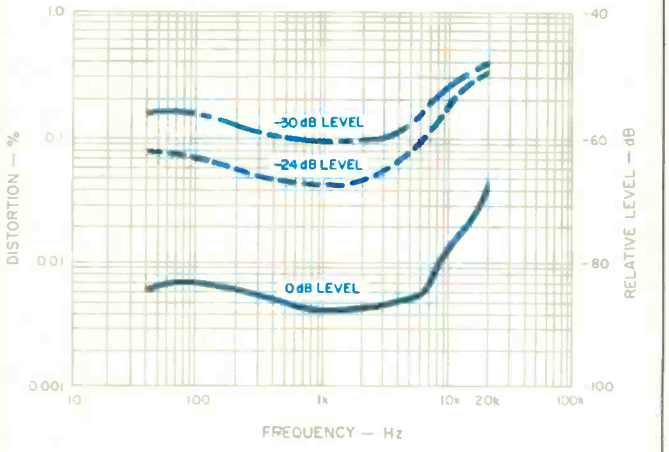


Fig. 2—Distortion vs. frequency at three recorded levels.

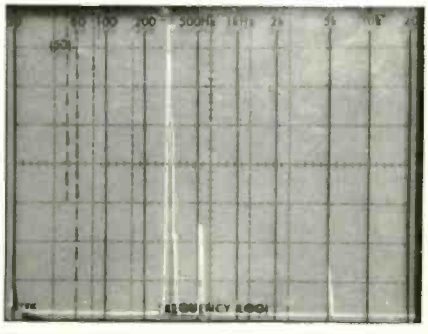


Fig. 3—Spectrum analysis of 20-kHz test signal (large spike) shows accompanying out-of-band components at approximately 24 and 44 kHz.

A conversation piece, B & O's CD X is one of the easiest players to use, with its touch controls and high level of programmability.

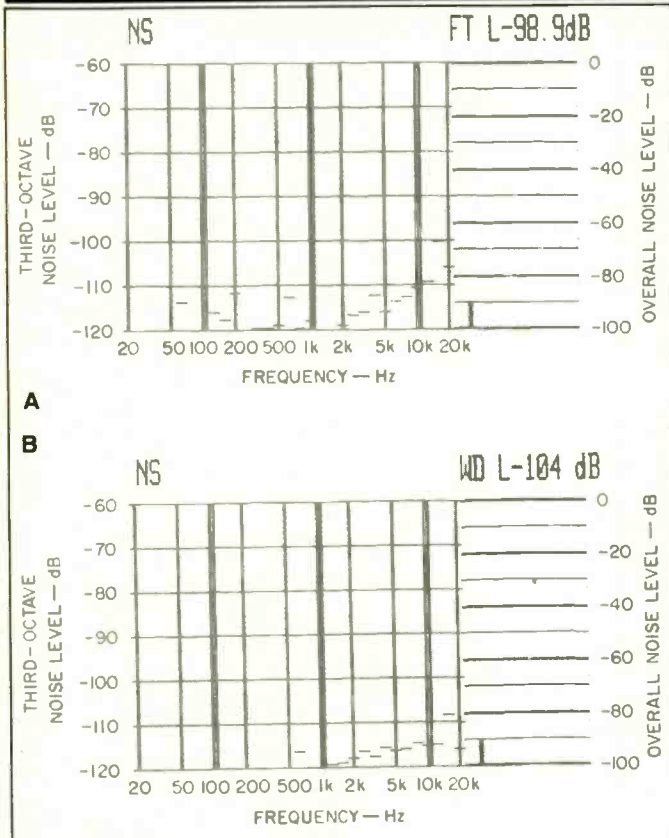


Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

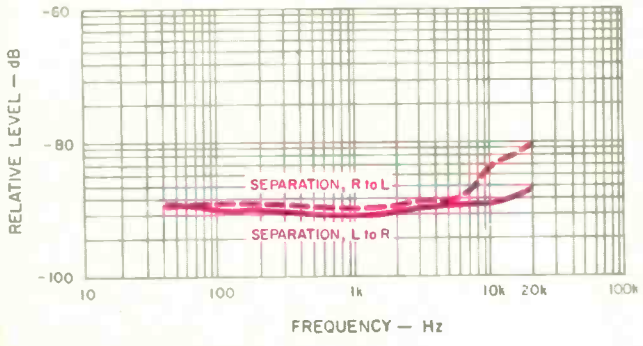


Fig. 5—Separation vs. frequency.

Fast-forward and fast-reverse search are accomplished by touching appropriate nomenclature on the "Sensi-touch" surface, but there is no audible sound while using these modes. The label "Return," touched once or repeatedly, allows you to move backwards, track by track, should you want to hear an earlier selection. Touching the word "Advance" skips tracks in the forward direction. Touching "Repeat" allows you to play a disc up to four times in succession. If you touch the word "Stop" briefly, disc play pauses and can be resumed from the same spot by touching "Play." However, if you hold your finger on the word "Stop" for more than 2 S, play is suspended completely and the disc stops spinning.

Instead of equipping the CD X with conventional female output jacks, Bang & Olufsen has supplied this unit with just over four feet of output cable, terminated in color-coded, male phono-tip plugs. Certainly the length of this cable is adequate for most installations. Even if more distance is needed between player and amplifier or preamplifier, you could always use an audio cable extension. But for the purist who insists upon using special audio cables (such as those equipped with gold-plated plugs), the arbitrary length and grade of the cable permanently affixed to the CD X may prove undesirable.

Measurements

Frequency response of the CD X was flat within 0.2 dB from 20 Hz to 20 kHz (see Fig. 1). I did notice a bit of ripple in the response, just before high-frequency cutoff above 20 kHz, which I can only attribute to the analog filters at the output of the D/A converters. These filters, by the way, are not of the steep, multi-pole type found in some CD players. Since B & O uses the same D/A conversion technique employed by Philips (i.e., four-times oversampling and 14-bit linear conversion), "brick-wall" filters are not required and an analog filter of gentle slope can be used to minimize phase shift.

Output voltage at 0 dB (maximum recorded level) measured almost precisely 2 V, as claimed. Actual harmonic distortion at mid-frequencies measured 0.003%, as claimed, for 0-dB level. However, when I used a distortion analyzer instead of a spectrum analyzer, readings were somewhat higher because of the presence of minute quantities of out-of-band components and, in some cases, negligible quantities of "beats" appearing within the audible spectrum. Figure 2, which shows distortion at various levels over a range of frequencies, includes these nonharmonically related components, which are reflected in the somewhat higher readings. In Fig. 3, a 20-kHz test signal is represented by a tall spike, while the shorter spike to its right is an unwanted component outside the audio range, at about 24.1 kHz. The additional small spike, near the extreme right, seems to be a component at the sampling frequency of the test disc, 44.1 kHz. The sweep in this display was linear, from 0 Hz to just over 50 kHz.

Unweighted signal-to-noise ratio for the CD X measured a very high 98.9 dB; with A-weighting inserted in the signal path, the S/N reading increased to 104.0 dB. Analyses of noise distribution within the audio range are shown for both types of measurements in Figs. 4A and 4B. Channel separa-

The only audible "glitch" heard was when I played the widest "scratch" track on the test disc; other players got by this without any problem.

tion, plotted in Fig. 5, measured a full 90 dB at mid-frequencies and at the bass end of the audio spectrum. Separation decreased to between 80 and 86 dB at the high-frequency extreme, depending upon which channel was measured.

Reproduction of a 1-kHz square wave by the Bang & Olufsen CD X, shown in Fig. 6, corresponds exactly to the results obtained for other players which employ the same type of oversampling and digital filtering. Reproduction of a unit pulse, as seen in Fig. 7, was also typical of the results obtained with other players employing this same kind of D/A conversion. The coincident positive crossing of the horizontal axis of both the 200-Hz signal on the left channel of the test disc and the 2-kHz signal on the right channel, depicted in Fig. 8, shows that there is no measurable phase shift occurring in this player, at least up to 2 kHz.

Tracking of this particular sample didn't quite measure up to some other third-generation CD players I have tested. Specifically, the error-correction circuitry plus the servo-tracking arrangement was unable to get through my obstacle-course defects disc. There was an audible "glitch" while playing the "scratch" track covered with a 900-micron-wide opaque area. Admittedly, that's the widest obstacle on this disc, but several recent players have been able to get by it without any audible problems. I hasten to add that the player had no trouble working its way through the simulated dust particles or the simulated fingerprint smudge on the same disc.

Use and Listening Tests

From the logical, brief, and easy-to-understand owner's manual to the unit's ease of operation, the CD X is a typical Bang & Olufsen masterpiece. I don't know just how much of the internal workings of the machine are built by B & O itself and how much of it is purchased from other sources. I suspect that the D/A conversion circuitry and related parts (or at least the D/A chips) come from Philips, while the transport mechanism, with its unique lift-up disc platter, must have originated with the designers at B & O.

As for sound quality, I had no quarrel whatever with the designers of this unit. In all respects, the sound reproduction was reminiscent of that of the various Philips (Magnavox) players I have tested over the past couple of years, all of which use the same basic D/A conversion approach. In other words, there was none of the harshness sometimes attributed to those machines that use a 44.1-kHz sampling rate and employ steep, multi-pole analog filters at their outputs. Among the newer CDs that I enjoyed while putting the CD X through its paces was a three-disc set of Richard Strauss' opera *Der Rosenkavalier* recorded at the Dresden Semper Opera House (Denon 100C37-7482-84). The naturalness and live quality of this recording were, in my opinion, faithfully reproduced by the CD X.

Another recent acquisition for my CD collection is *West Side Story*, a two-disc set with the composer himself, Leonard Bernstein, conducting and which features an operatic cast. Included is Kiri Te Kanawa, whose lovely, clear voice benefits from the CD technique. (This recording, Deutsche Grammophon's 415253-2, bears the designation "DDD," indicating that it was digitally mastered, digitally mixed and digitally recorded. When, by the way, are other record companies besides the Polygram group going to start using this sensible coding system to let us know how a given CD was produced?)

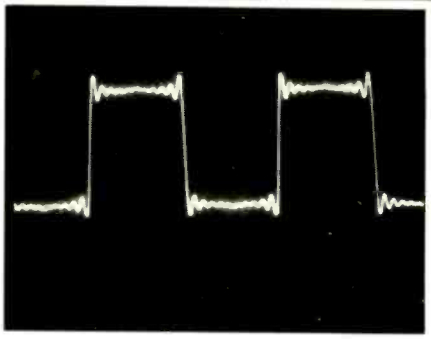


Fig. 6—Reproduction of a 1-kHz square wave.

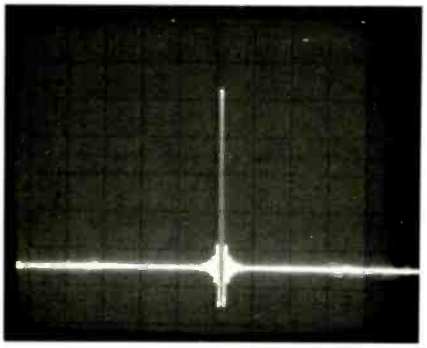


Fig. 7—Single-pulse test.

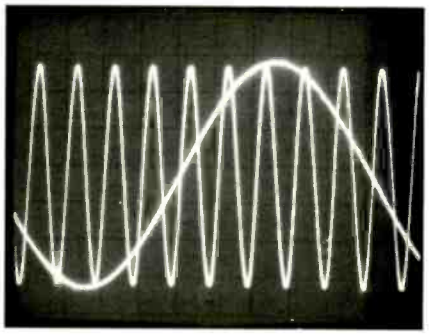


Fig. 8—Two-tone phase-test signal (200 Hz and 20 kHz) shows no phase delay or error.

Getting back to the Bang & Olufsen CD X, its price, in my opinion, is quite reasonable considering its many operating features, the ease with which they're executed and—of course—that magnificent human engineering which has become almost synonymous with B & O designs.

Leonard Feldman

15

TOSHIBA XR-V22 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 5 Hz to 20 kHz, ±0.5 dB.
THD: 0.003%.
Dynamic Range: 96 dB.
Number of Programmable Selections: 30 (15 per tray).
Channel Separation: 90 dB.
Line Output Level: 2.0 V.
Power Requirements: 120 V, 60 Hz, 22 watts.
Dimensions: 13.4 in. W × 4.3 in. H × 14.25 in. D (34 cm × 10.9 cm × 36.2 cm).
Weight: 13.64 lbs. (6.2 kg).
Price: $499.
Company Address: 82 Totowa Rd., Wayne, N.J. 07470.
(First published this issue)

I did a double take when I unpacked Toshiba's Model XR-V22. Perhaps taking a cue from the recent proliferation of double-well cassette decks, Toshiba has fashioned a double-tray CD player, one that can successively play two Compact Discs, or selected tracks from one CD followed by selected tracks from a second. But if you amateur disc jockeys (or even you professionals) out there are getting the idea that this novel arrangement will enable you to do with CDs what dual turntables allow you to do with LPs, forget it.

The Toshiba XR-V22 does *not* allow you to intermix cuts from the two discs mounted in its two trays—at least not in a preprogrammed way. Of course, you can play a single track from one disc, then a selected track from the other, but you have to do this manually if you want to continue to switch back and forth. You can program up to 15 selections in random order for each disc, but all 15 from one disc have to be played through before the machine will switch over to the alternate disc. So, in a sense, the Toshiba player is really a record changer of sorts, one with a capacity of two discs. Furthermore, since the machine houses only one set of playback electronics (D/A conversion circuitry and stereo analog output circuitry), another popular DJ trick is not available to XR-V22 owners—fading from a cut on one disc to a cut on the second disc.

Some other convenience features now found on many similarly priced CD players are absent here. For example, it is not possible to program by index number. There is no audible fast search, and no remote control is provided.

Nevertheless, the XR-V22 is an interesting machine that I thoroughly enjoyed using and testing. If it is combined with Toshiba's SL-V11 stereo sound system (which includes their Model SK-V11 cassette deck/receiver), pressing the "Play" button on the CD player automatically switches the receiver's program selector to the CD/AUX mode. Synchronous recording from disc to tape is also possible when the player is used with the SL-V11 system.

Control Layout

The XR-V22's "Power" pushbutton is at the lower left of its front panel. Separate "Open/Close" buttons along the top of the panel activate the "A" and "B" disc drawers that slide out in the usual fashion. The drawers, positioned side by side, occupy most of the width of the panel; above each are 15 numbered LEDs. When a track is playing, a corresponding LED flashes on and off. During programming, the LEDs corresponding to the selected tracks illuminate continuously. When the machine is in the pause mode, an LED corresponding to the current track flashes rapidly. "A-Play" and "B-Play" pushbuttons that control the similarly identified trays are at the right end of the panel. A "Pause/Stop" button below these interrupts play if pressed once and discontinues play or programming if pressed a second time. "Up/FF" and "Down/Rev" buttons, just below "Pause/Stop," perform dual functions. If either is pressed, the pickup advances or retreats one track at a time. If either is pressed while the "Play" button is held down, fast-forward or fast-reverse playing of the disc occurs.

A digital display near the top right of the front panel shows the number of the track being played, elapsed time within that track, or total elapsed time; display modes are changed

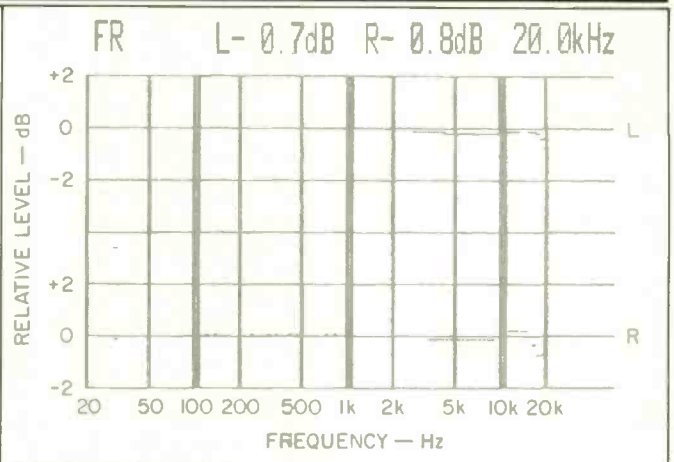


Fig. 1—Frequency response, left (top) and right channels.

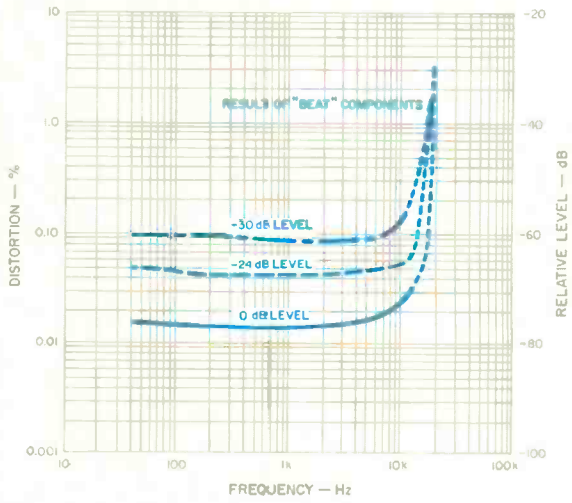


Fig. 2—THD vs. frequency at three signal levels; see text.

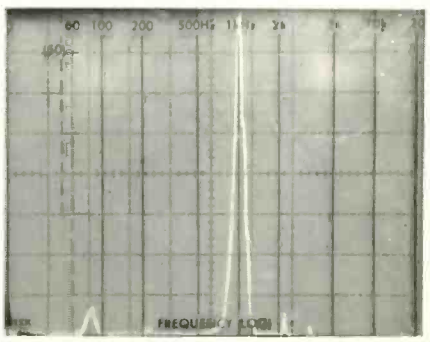


Fig. 3—Spectrum analysis of a 1-kHz signal (tall spike) shows small amounts of distortion at 2 and 3 kHz.

To me, the advantage of the XR-V22 lies primarily in allowing the user to play two-disc CD sets without interrupting the music's continuity.

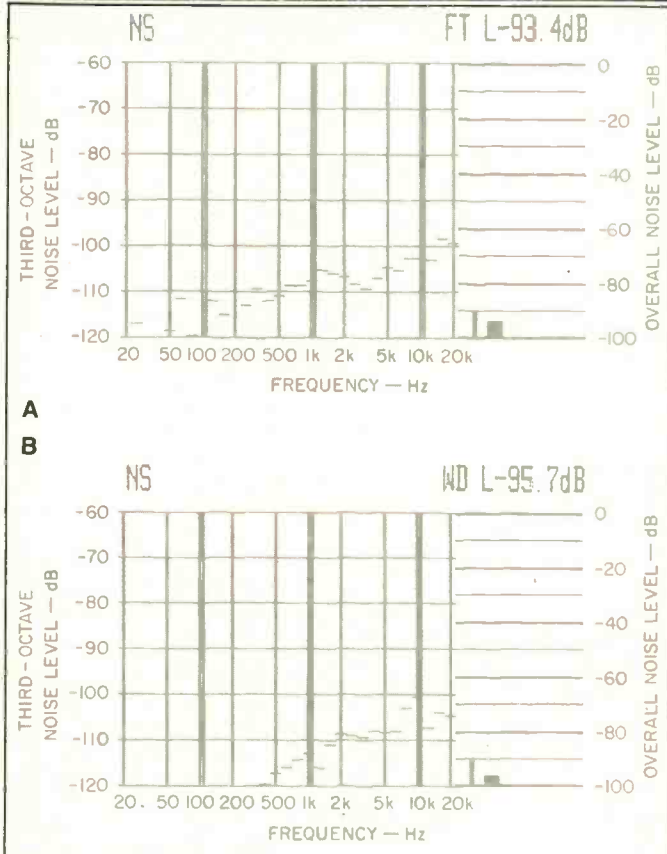


Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

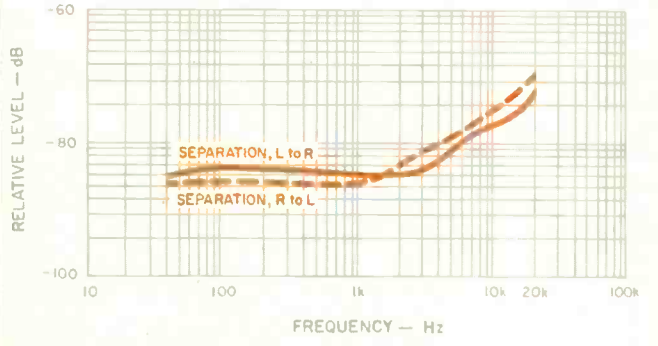


Fig. 5—Separation vs. frequency.

with the "Display" button at the lower right of the panel. Ten numbered keys at the lower left are used in programming, with nearby "Memory A" and "Memory B" buttons determining whether the programming is intended for disc A or B. The "Clear" button, just to the right of the memory controls, cancels any programming. A "Repeat" button just below the "Display" button toggles the repeat function on and off and can be used to repeat a single track, an entire disc, or even the two discs (or their selected program tracks).

In addition to the usual left- and right-channel output jacks on the rear panel, there is a multi-pin connector for a special supplied cable which links the player and Toshiba's cassette deck/receiver. It is this cable connection that allows the one-touch program selection and the synchronized recording functions mentioned earlier.

Measurements

Frequency response of the XR-V22, shown in Fig. 1, was flat to within the claimed ±0.5 dB over the entire audio range. Actually, it would be more accurate to say that the response was flat from 20 Hz to 20 kHz, +0, −0.8 dB. Note that the vertical scale in Fig. 1 is only 2 dB per division.

One surprising result of my tests was the relatively large amount of harmonic distortion observed for test frequencies at maximum recorded level. Normally, levels of THD below 0.01% are observed for such test tones, with harmonic distortion rising almost linearly as lower level signals are analyzed. Although certainly low by analog standards, the THD levels at 0-dB recorded level, plotted in Fig. 2, were higher than Toshiba's claimed 0.003%. Further investigation showed that these figures (typically 0.015%) were caused by familiar "analog" distortion. Apparently, the player's analog output stages couldn't quite handle the high output voltage corresponding to maximum recorded level. They missed by no more than about 1 dB, for, when I lowered the test-signal level by that amount (I have a test track that offers signals at −1.0 and −6.0 dB relative to maximum output), THD dropped right down to about 0.005%. This figure is still not quite the 0.003% claimed, but it is certainly of the order I have come to expect from CD players.

The seemingly high harmonic distortion readings observed when checking THD of high-frequency test signals (16, 19, and 20 kHz) are not really the result of harmonic distortion components. Rather, these higher readings (shown by the steeply ascending dashed lines beyond 10 kHz in Fig. 2) are caused by "beats" between the sampling frequency and the high-frequency test signal. Figure 3 confirms that this player produces some measurable harmonic distortion for a 1-kHz test signal. Just to the right of the tall spike (the desired 1-kHz test signal at maximum recorded level), you can see a small component of distortion at around 2 kHz and another, smaller component at 3 kHz.

Unweighted signal-to-noise ratio measured 93.4 dB; the A-weighted measurement was 95.7 dB, very close to Toshiba's claim of 96 dB for dynamic range. (See Figs. 4A and 4B.) SMPTE IM measured 0.013% at maximum recorded level, increasing to 0.027% at −20 dB recorded level. CCIF IM (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was a low 0.0057% at maximum recorded level and 0.0038% at −10 dB recorded level.

Considering the price of this Toshiba CD player, even the moderate amount of flexibility afforded by the double disc drawers comes as a bonus.

Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 70.0 dB at the high-frequency extreme to 85.4 dB at mid-frequencies.

Reproduction of a 1-kHz square wave is shown in Fig. 6. The wave shape indicates that Toshiba is using sharp-cutoff, "brick-wall" analog filters at the output of the player's D/A converters. The appearance of the unit pulse in Fig. 7, as reproduced from a Philips test disc, provides further evidence of steep analog filters at the player's output following D/A conversion. The phase error at high frequencies usually introduced by such brick-wall filtering is evident in Fig. 8, where 2- and 20-kHz signals are reproduced from the left and right channels of a special test disc. If no phase error were present, both signals would cross the zero axis in a positive-going direction at the same time. Figure 8 shows that when the low-frequency signal is crossing the axis in a positive direction, the higher frequency signal is crossing the zero axis in a negative-going direction. It is not possible to translate these results into an actual number of degrees of phase error or time delay, but it is clear that the error is at least 180° of the 20-kHz signal or a minimum of 25 μS. Of course, the error could be higher—75 μS (540° of a 20-kHz signal) or even 900°.

Like a number of other CD players, the Toshiba unit had no trouble tracking through my simulated-defects disc, totally ignoring the widest portion of the opaque wedge inscribed on that disc as well as the increasingly wide "dust" specks and the simulated fingerprint. Resistance to mild vibration and external shock was also excellent.

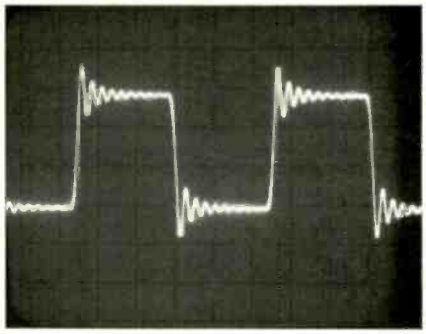


Fig. 6—Reproduction of a 1-kHz square wave.

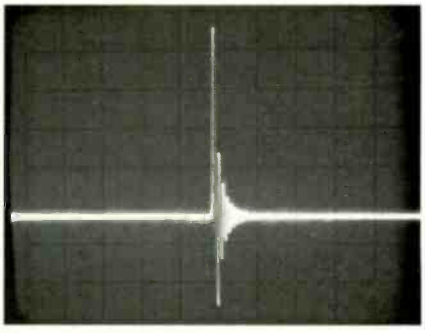


Fig. 7—Unit-pulse test.

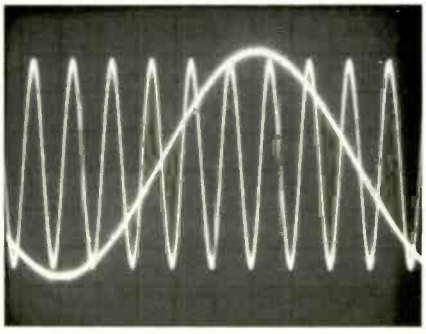


Fig. 8—Phase-error check using 2- and 20-kHz tones; see text.

Use and Listening Tests

From my point of view, the advantage of the XR-V22 lies primarily in my being able to play a two-disc CD set without having to interrupt the music. I recently purchased the Deutsche Grammophon recording of Leonard Bernstein conducting his *West Side Story*—a most notable performance in which he uses operatic stars rather than Broadway singers. The drama of *West Side Story* is just about reaching its climax at the end of disc one, and it was nice to have disc two start playing without any interruption that would have broken the continuity and the dramatic intensity of the music.

As for sound quality, the reproduction achieved by the XR-V22 was acceptable, though I am becoming increasingly conscious of the sonic difference between CD players that utilize digital filtering and those that don't. Again, I would caution would-be DJs that this player, while cleverly designed and interesting in its own right, will not allow you to perform the tricks you have come to expect as standard with dual analog turntable arrangements. It *will* play two discs end-to-end (and repeatedly, if you wish) or selected tracks of one disc followed by selected tracks of another. You can start with a disc in either drawer, but you can't flip back and forth from one to another, track by track, unless you program only one track per disc per drawer. Considering the price of the XR-V22, however, even the moderate amount of additional flexibility afforded by the two disc drawers certainly is a bonus over and above the more commonly found features on CD players in this price range.

Leonard Feldman

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YAMAHA CD-3 COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 3 Hz to 20 kHz, +0.5, −1.0 dB.
THD + Noise: 0.004%.
Dynamic Range: 96 dB.
S/N Ratio: 100 dB, A-weighted.
Number of Programmable Selections: 9.
Channel Separation: 90 dB.
Line Output Level: 2.0 V
Headphone Output Level: 0.16 V at −20 dB (8 ohms).
Power Requirements: 120 V, 60 Hz, 20 watts.
Dimensions: 17⅛ in. W × 3-11/16 in. H × 11-7/16 in. D (43.5 cm × 9.4 cm × 29.1 cm).
Weight: 9 lbs., 11 oz. (4.4 kg).
Price: $499.
Company Address: P.O. Box 6600, Buena Park, Cal. 90620.
(First published this issue)

Yamaha has consistently been at the forefront of Compact Disc technology and product development. I recall how impressed I was with their first CD player, the CD-1. It was practically hand-built and so costly to produce that, despite its steep selling price, the company insists to this day that they actually lost money on each sale. If so, the investment certainly paid off, for Yamaha's second- and third-generation players continue to represent state-of-the-art design and performance. The current entry, the Model CD-3, employs a set of large-scale integrated circuits developed and produced by Yamaha. The circuitry employs digital filtering and 88.2-kHz oversampling, as did earlier Yamaha players. Access to specific tracks or index points is now faster than before, and you can program up to nine items for playback in true random order. Admittedly, this number of programmable items falls short of the number found on some competitive units, but I suspect Yamaha has limited the programmability to a practical and economical number (how often will you really need to program more than nine items on any one disc?) and applied the money it saved to such things as faster access, excellent tracking stability, and, most important of all, superb sound reproduction.

The CD-3 is equipped with a wireless remote control that duplicates just about every function of the main unit, including random-access programming. The remote control even includes buttons for opening and closing the disc compartment (presumably to speed disc installation in the tray) and for sequentially altering the information illuminated on the CD-3's front-panel display. Because the remote module does not have a number keypad (the main panel doesn't have one, either), you may at first doubt that it could be used for programming. But it *is* possible, thanks to the clever and simple way in which programming is accomplished on the CD-3. More on that in a moment.

Control Layout

The slide-out disc tray and "Power" pushbutton of the CD-3 are located at the left of the front panel. Just to the tray's right is an elaborate, multi-function display. It shows track number, elapsed time, total disc time (in stop mode only), index number, activation of the repeat-play function (including activation of the A-to-B musical-phrase-repeat feature, which plays and replays the music between any two user-defined points on the disc), and even confirmation (by a light) that remote-control commands have been received and registered. An "Open/Close" key for operating the disc tray and a key which alters the display mode are further to the right; below these keys, and also to their right, are the controls used for play and programming.

The controls used for play include large "Play" and "Pause/Stop" buttons as well as smaller, paired buttons which shift the laser ahead or back to desired locations on the disc: "+" and "−" buttons step the laser between track beginnings, while the buttons marked with forward and reverse double arrows move it to any point on the disc. The double-arrow search functions are silent if undertaken from pause mode, but audible (at about one-fourth normal volume) if undertaken from play mode. The search function begins at a moderate speed, then speeds up if the button is held down more than 3 S.

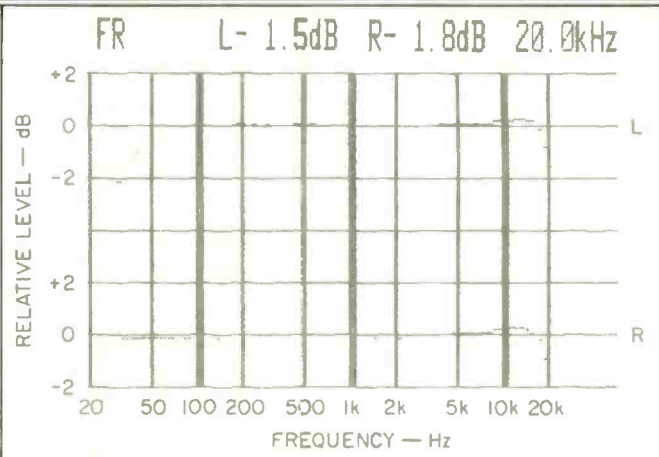

Fig. 1—Frequency response, left (top) and right channels.

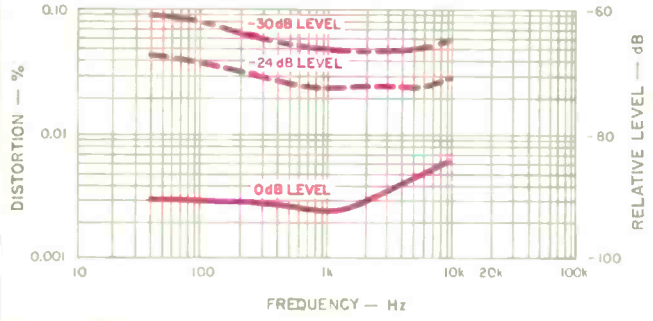

Fig. 2—Distortion vs. frequency, at three signal levels, using low-pass filter (see text).

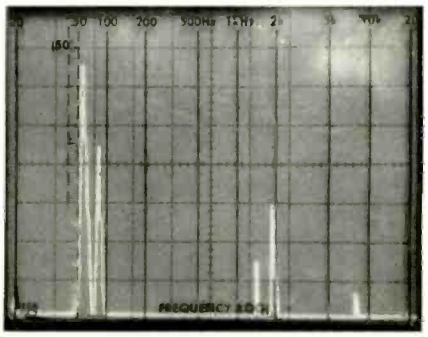

Fig. 3—Spectrum analysis from 0 Hz to 100 kHz shows 20-kHz test tone and out-of-band components at 68.1 and 88.1 kHz.

The "space play" feature inserts a 4-S delay between selections, aiding tape recording for users who also have programmable tape decks.

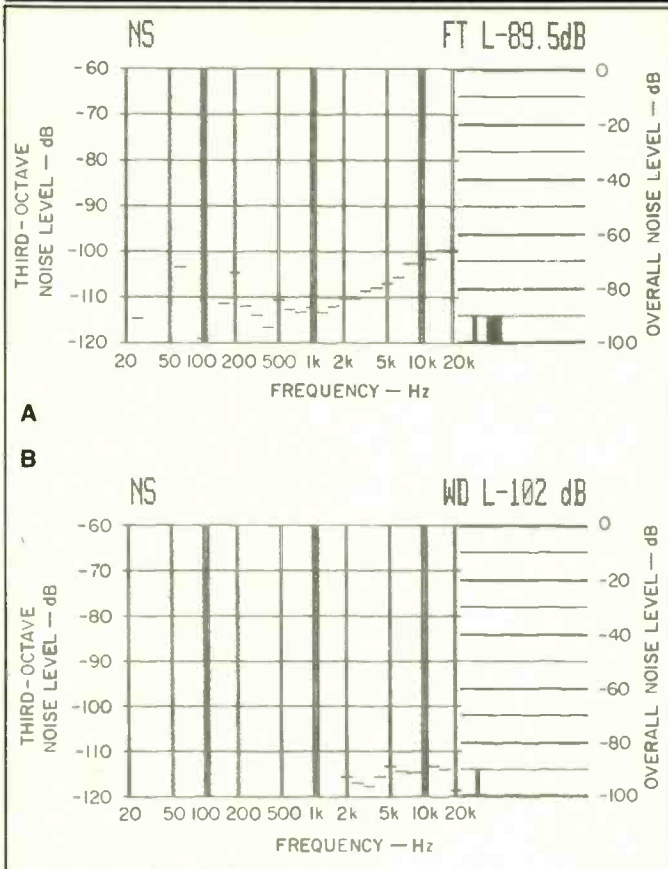

Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

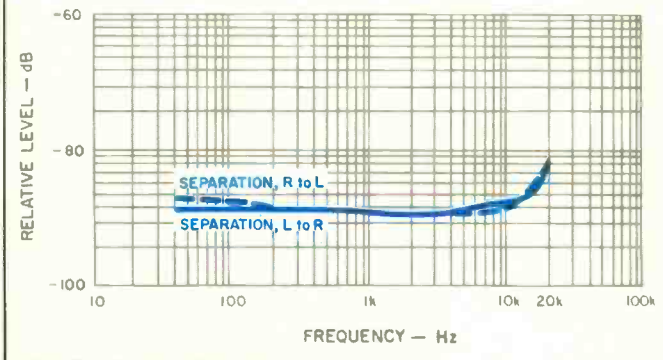

Fig. 5—Separation vs. frequency.

The double-arrow keys are also used for access to indexed portions of long disc tracks. After the track number is set with the "+" or "−" key, the forward double-arrow key is pressed one or more times to get the desired index number—e.g., three times for index number 3. The display then shows the selection and index numbers, and an "Index" light beneath the numerical display illuminates. Index access is available only in nonprogrammed play.

Four keys are only involved in programming and repeat play: "Set/Check" and "Clear" for programming, "On/Off" and A-to-B for repeat functions. To program selections, you merely press the "Set/Check" program button, advance or retreat the displayed track number via the "+" or "−" button, and then press "Set/Check" again, to memorize the desired track number. ("Clear" erases the program, as does opening the disc drawer.) The display shows which program number you are setting and which track you are setting it to. During programmed playback, the display repeats this information unless you have set it to its elapsed-time mode.

Pressing the "On/Off" repeat button sets the CD-3 to repeat the entire disc or, during programmed play, the entire program. The A-to-B button is used for repeat play of user-designated phrases. Press the button once when you reach the point on the disc at which you wish repeat play to begin, and press it again when you reach the point where you wish repeat play to end. (You can even program the end point first, and then the start point, if desired.) Indicator lights in the display area show the status of both repeat modes.

At the panel's extreme right are the headphone jack and the headphone output-level control. Output jacks on the rear panel provide a fixed output of approximately 2 V at 0 dB (maximum) recorded level.

Measurements

Frequency response of the Yamaha CD-3, shown in Fig. 1, was slightly attenuated at 20 kHz, measuring −1.5 dB for the left channel and −1.8 dB for the right. A slight rise in response near the high end—not greater than about 0.2 dB at about 14 kHz—suggested to me that even though Yamaha used gentle analog filters following D/A conversion, these filters may not have been precisely optimized for the impedance into which they were terminated.

When I first measured harmonic distortion as a function of frequency, I was dismayed by the high readings I obtained. Careful observation of the results clarified the situation. There were high orders of out-of-band components caused by "beats" between the 88.2-kHz sampling frequency and the desired audio frequency. Since the highest possible recorded frequency on a CD is 20 kHz, the frequency closest to the audio band would be 68.2 kHz (88.2 kHz minus 20 kHz). Yamaha obviously felt this frequency was far enough removed from the end of the audio band that it didn't need to be totally filtered out. Until I introduced a band-pass filter, the spurious high frequencies showed up clearly on an oscilloscope. Once the band-pass filter was introduced, I recorded the distortion values plotted in Fig. 2. THD at 1 kHz was the lowest I have measured yet: 0.0025%, a bit lower than Yamaha's claimed 0.004%. The three plots

Yamaha's early investment in LSIs for its D/A conversion is paying off now. The consumer benefit comes in terms of a high price/performance ratio.

of Fig. 2 extend only to 10 kHz because of the presence of the band-pass filter in the measurement chain. Since this filter starts cutting at 20 kHz, the second harmonic of 10 kHz, readings of THD above 10 kHz would have been meaningless. To document what was happening when I did not use the band-pass filter, I used a spectrum analyzer to sweep linearly from 0 Hz to 100 kHz while a 20-kHz tone was being reproduced by the CD-3. The results of this sweep are shown in Fig. 3.

Unweighted signal-to-noise ratio measured 89.5 dB, and the A-weighted measurement was a very high 102.0 dB, 2 dB higher than claimed by Yamaha. (See Figs. 4A and 4B.) SMPTE-IM distortion measured 0.003% at maximum recorded level, increasing to 0.03% at −20 dB recorded level. CCIF-IM distortion (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was an extremely low 0.0016% at maximum recorded level and 0.0037% at −10 dB recorded level. Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 80.0 dB at the high-frequency extreme to 88.0 dB at mid-frequencies.

Reproduction of a 1-kHz square wave by this player is shown in Fig. 6. The reproduced wave shape is typical for CD players which employ double-rate oversampling and digital filtering. The unit pulse in Fig. 7, as reproduced from a Philips test disc, further confirms the use of digital filtering and oversampling in this player's D/A circuitry.

It's becoming almost pointless to check out error correction and tracking stability using my admittedly antiquated "special defects" disc from Philips, which was created when CD players and CD technology were in their infancy. Almost every player I have tested in the past six months or so has had no trouble zipping right through the simulated scratch (up to 900 microns in width), the simulated dust specks (up to 800 microns in diameter), and the simulated fingerprint smudge, which extends over two complete musical tracks of the test disc.

The Yamaha CD-3 ranks with the best of them as far as tracking stability and error correction are concerned. It played right through all of the simulated defects on the test disc as if they weren't there. Resistance to mild vibration and external shock was also very good; the CD-3 continued playing with no audible interruptions, skipping or disc rejection while I repeatedly tapped its top and sides.

Use and Listening Tests

After having studied the earlier CD-1, CD-X1 and CD-2 from Yamaha, working with the CD-3 made me realize just how far Compact Disc players have come in only two years. The CD-3 sounds as good as, if not better than, the CD-1, that expensive first model. If there were any rough edges to the sound of those earlier players, they've been smoothed to complete inaudibility. In my opinion, Yamaha followed the right course from the beginning in their choice of methods for D/A conversion. Many companies that once insisted steep, analog filters were just as good as oversampling and digital filtering are coming around to the technique that Yamaha has used from the start. In addition, having developed its own dedicated LSI circuits for decoding, Yamaha is now benefiting from their early investment—as are consumers—in terms of a high price/performance ratio for the CD-3.

During my listening tests, I discovered a nice touch that's described in Yamaha's promotional literature but overlooked in the CD-3's instruction manual, called "space play." During play, the CD-3 inserts a 4-S pause between tracks, so that tapes made from CDs will include the pauses that tell programmable cassette decks where each track starts. Another feature I found—one that *is* prominently mentioned in the owner's manual—is the capability of the CD-3 to turn itself on and begin playing when its power cord is connected to an external timer. Using this arrangement, you can actually wake up to music reproduced from your favorite CDs. Take it from one who is not enraptured with early morning blarings from a clock radio, waking up to clean music from a CD sure beats hearing a raucous-voiced DJ tell you about all the terrible world events that occurred while you were asleep. *Leonard Feldman*

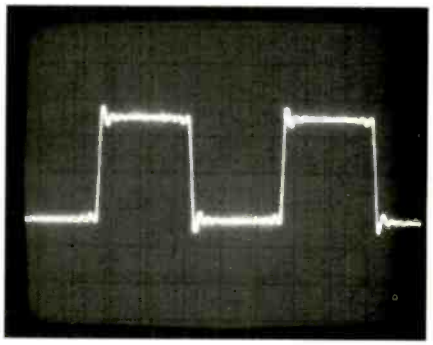

Fig. 6— Reproduction of a 1-kHz square wave.

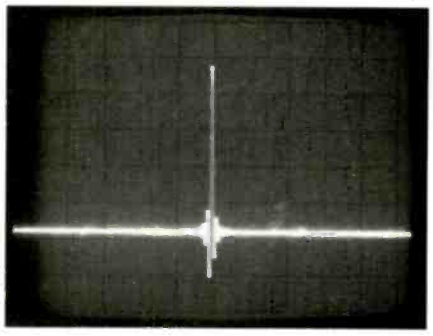

Fig. 7— Single-pulse test.

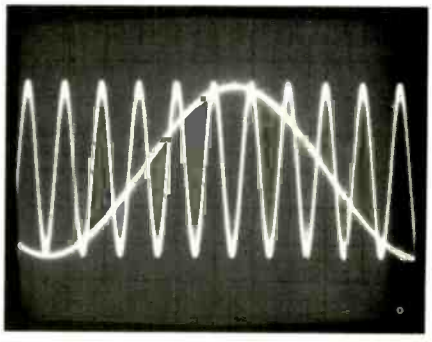

Fig. 8— Phase-error check using tones of 2 and 20 kHz reveals minimal phase shift at high frequencies.

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KENWOOD DP-1100II COMPACT DISC PLAYER

Manufacturer's Specifications
Frequency Response: 2 Hz to 20 kHz, ±0.5 dB.
THD: 0.0015% at 1 kHz.
Dynamic Range: 95 dB.
Number of Programmable Selections: 16 (tracks and index points).
Channel Separation: 90 dB at 1 kHz.
Line Output Level: 2.0 V.
Power Consumption: 120 V, 60 Hz, 23 watts.
Dimensions: 17-5/16 in. W × 3½ in. H × 12-3/16 in. D (44 cm × 8.8 cm × 31 cm).
Weight: 15 lbs. (6.8 kg)
Price: $725.
Company Address: 1315 East Watsoncenter Rd., Carson, Cal. 90745.
(First published this issue)

Of the three Compact Disc players offered by Kenwood Electronics, the DP-1100II is by far the most feature-laden. It is also the only one to offer remote control. In fact, the full-function wireless module offers one extra feature not found on the front panel itself. By pressing a key labelled "M-Scan" (for music scan), you can, from the comfort of your listening position, cause the unit to play back the first 10 S of each track on a disc.

Programming of up to 16 selections, including track and index numbers, may be performed at the front panel or via the hand-held remote module. Repeat play of a track, a complete disc, or a memorized program of random tracks is possible. Fast-forward and fast-reverse auditioning, as well as music search, are also easy to accomplish, in the same straightforward way as that offered by most current CD players.

The only thing that I found unusual about operating the DP-1100II was the procedure needed to play a memorized program. Entry of the selections is conventional enough. You simply press the desired track (or track and index) numbers in the order you want to hear them and follow each selection by pressing a "Memory" button. So far, that's like most other players. To *play* the program, however, instead of simply pressing the "Play" button, it is necessary to call up the first memorized selection number you want to hear, using a pushbutton labelled "M-Read" (memory read). *Then* you press the "Play" button. If you simply press "Play" after entering and storing a program, the pickup will start playing the disc from track number one, as if you had not entered any selections in memory. Of course, once you *know* how to get the programmed selections started, everything works fine. It's just that I found the method a bit complicated, compared to other programmable CD players.

Control Layout

A large "Power" on/off switch and stereo headphone jack are at the left end of the front panel. A slider-type headphone level control is near the headphone jack, below the left edge of the disc tray. The disc tray is opened and closed by means of a pushbutton on its front surface; it can also be closed by pushing the "Play" button once a disc has been loaded. If you push "Play" when there is no disc in the tray, the tray will open (if it was closed), as if to remind you that you have forgotten to load a disc.

Ten small, numerically labelled pushbuttons and the "Memory" button are arranged in a single row below the disc tray. To the right of the tray are the sensor for the remote control and a large fluorescent display area where a wide variety of useful information appears. When a disc is loaded, the words "Data" and "Disc" light up to show that the disc's table of contents has been read by the laser pickup and that the disc is, in fact, properly installed in the tray. Track, index, and time indications are prominently displayed. Time may be shown in elapsed minutes and seconds of the current selection, total time from start of the disc, or remaining time of the entire disc. When the "Memory" button is pressed, a tiny "Memory" light blinks to show the next program slot in which track and index storage is possible. During memory play, this indicator shows the program number being played. As many as 16 numbered

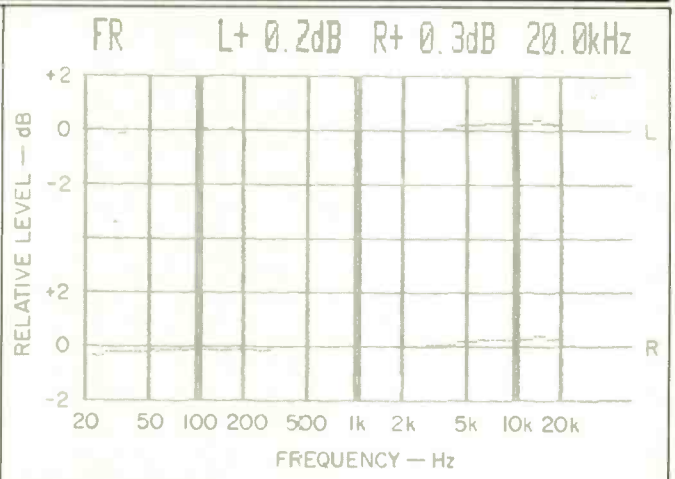


Fig. 1—Frequency response, left (top) and right channels.

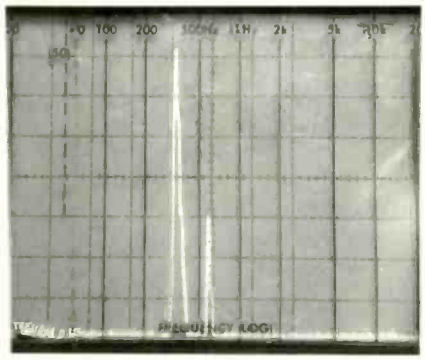


Fig. 2—Spectrum analysis of 20-kHz test signal (large spike) shows unwanted component (shorter spike) outside the audio frequency range.

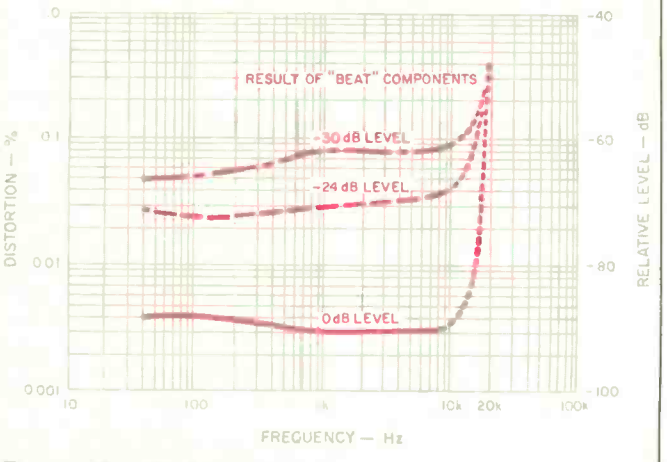


Fig. 3—THD vs. frequency at three signal levels.

Once you know how to get the programmed selections started, everything works fine. It's just that the method is a bit unusual.

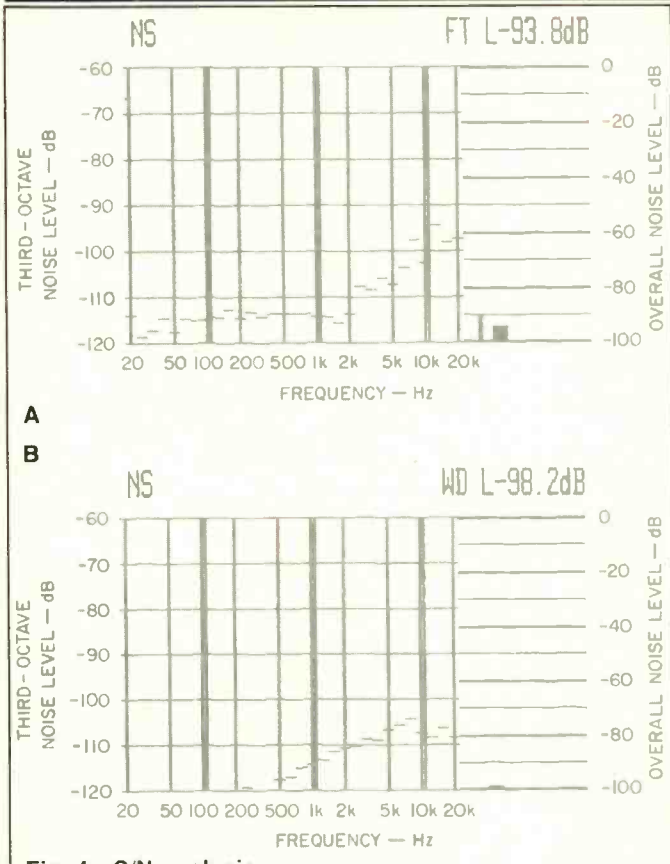


Fig. 4—S/N analysis, unweighted (A) and A-weighted (B).

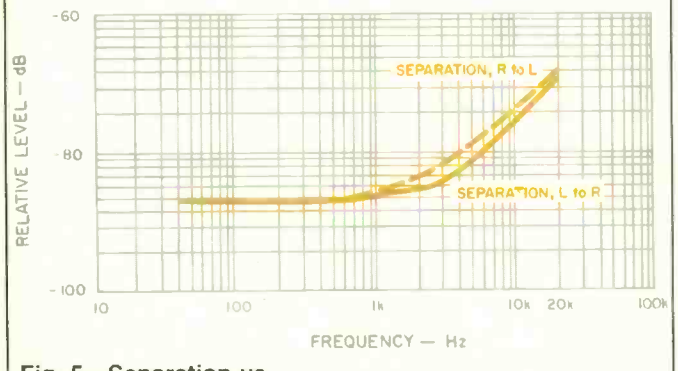


Fig. 5—Separation vs. frequency.

music-channel indicators light when track numbers are stored in memory. An "M-Scan" indicator lights when the music-scan key on the remote control is pressed, and a "Repeat" indicator lights in the display area when the "Repeat" switch has been toggled on.

A large "Play" button and an associated "Play Indicator" light are to the right of the display area; below these are "Pause" and "Stop" pushbuttons. To their left, along the bottom of the unit, are the remaining controls. These include the forward and backward "Music Search" buttons (which move the pickup one track at a time when pushed), the fast-forward and fast-reverse pushbuttons, the "Repeat" button, a pushbutton for scrolling through the time-display modes, and "Clear" and "M-Read" buttons. The fast-forward and fast-reverse buttons will move the pickup rapidly in either direction. If either is pressed during play, audible cueing results. If pressed during "Pause," no sound will be heard but pickup movement will be even faster. In order to cancel a memorized program, it is necessary to press the "M-Read" button and the "Clear" button simultaneously. (That requirement had me stumped for a while, until I resorted to the owner's manual.)

The rear panel is equipped with the usual pair of line output jacks. There is no output level control. Output level is fixed at the usual 2.0 V rms for maximum recorded level.

Measurements

Frequency response of the DP-1100II, shown in Fig. 1, was essentially flat from 20 Hz to 20 kHz, with a slight rise near the high end amounting to no more than about 0.4 dB and a roll-off beginning at 20 kHz. As you can see in Fig. 1, response at 20 kHz was up 0.2 dB in the left channel and 0.3 dB in the right. As usual, I have expanded the vertical scale in Fig. 1 to 2 dB per division so that minor variations from flat response will show up more clearly.

As is true of so many players, harmonic distortion readings above 10 kHz are deceptive (and, in fact, rather meaningless), since many CD units tend to create "beats" between the desired high-frequency signal found on the test disc and the sampling frequency (in this case, 44.1 kHz). This effect is clearly illustrated in the spectrum analysis of Fig. 2, in which the analyzer was linearly swept from 0 Hz to 50 kHz. The tall spike near the center is the desired 20-kHz signal, while the shorter one to the right is an unwanted beat outside the audio frequency range.

By introducing a band-pass filter (with a cutoff of 20 kHz), I was able to isolate the "real" harmonic distortion from the nonharmonically related components. Under these test conditions, THD at 1 kHz was a very low 0.003% at mid-frequencies for 0-dB recorded output. The three curves of Fig. 3 depict harmonic distortion at 0-dB (maximum) recorded level and at −24 and −30 dB levels. The curves above 10 kHz, indicated as small dashes, represent the increasing amplitudes of the nonharmonically related beats appearing outside the audio band. Linearity was nearly perfect from 0 dB down to −60 dB output level, with deviation from perfect linearity never exceeding 0.2 dB over that range.

Unweighted signal-to-noise ratio measured 93.8 dB, and the A-weighted measurement was 98.2 dB (see Figs. 4A and 4B). SMPTE IM measured 0.0045% at maximum re-

I wish Kenwood had put as much emphasis on this player's internal circuitry as on making sure its convenience features were up to snuff.

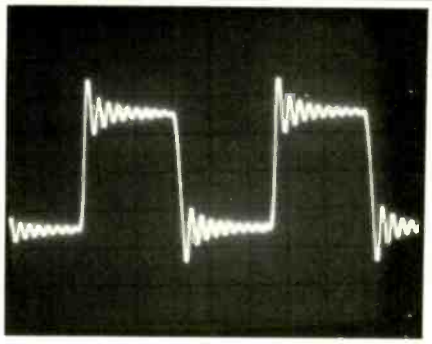


Fig. 6—Reproduction of a 1-kHz square wave.

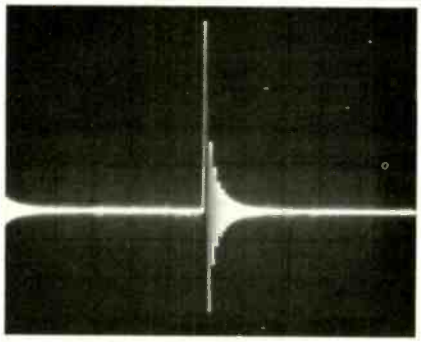


Fig. 7—Unit-pulse test.

corded level, increasing to 0.03% at −20 dB recorded level. CCIF IM (twin-tone, using 19- and 20-kHz tones at the equivalent of highest recorded level) was a low 0.0015% at maximum recorded level and 0.0020% at −10 dB recorded level. Stereo separation, plotted as a function of frequency in Fig. 5, ranged from 68.0 dB at the high-frequency extreme to 86.1 dB at middle and low frequencies.

Reproduction of a 1-kHz square wave is shown in the 'scope photo of Fig. 6. The reproduced wave shape is typical of that produced by CD players which employ steep, multi-pole analog filtering following D/A conversion. The unit pulse in Fig. 7 further confirms the use of such "brick-wall" filtering in this player's post-D/A output circuitry.

As is true of most CD players that employ analog filters, the DP-1100II exhibited substantial phase shift or phase error when reproducing high-frequency signals. This phase error, though not precisely calculable, is shown in Fig. 8, in which the time relationship between 2- and 20-kHz signals is depicted in the dual-trace oscilloscope photo. If the two signals were in correct time relationship, they would cross the zero axis in a positive-going direction at the same instant. As you can see in Fig. 8, that is not the case. As the low-frequency (left-channel) signal crosses the axis in a positive-going direction, the high-frequency signal is crossing the axis in the opposite direction, indicating at least a 180° phase delay between the two (25μS). It is possible that the delay is considerably more, since a 540° delay (75μS) or even a 900° delay would produce the same pattern on the oscilloscope.

My persistence in checking error correction and tracking with the somewhat antiquated defects disc paid off here. The DP-1100II mistracked almost from the beginning of the wedge designed to simulate a scratch. It was able to correct only for opaque sections 400 microns wide—the minimum specified by the Philips/Sony standard for CD players. The player did not do much better in playing through simulated dust particles. It was able to ignore simulated particles 300 microns in diameter but was tripped up by the next larger particle, one with a 500-micron diameter. About the only defect that the Kenwood player had no trouble getting through was the simulated fingerprint smudge.

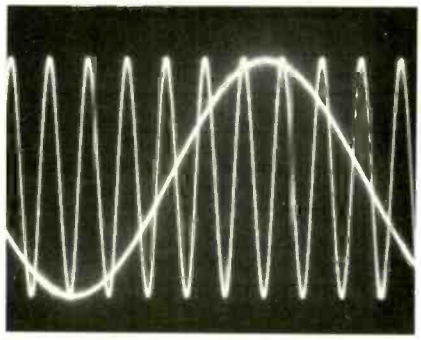


Fig. 8—Two-tone phase test using 2- and 20-kHz signals indicates that they are not reproduced with the proper time relationship.

Use and Listening Tests

I have already described the unusual programming sequences required by this unit. One can learn them in short order and get used to the player's somewhat unorthodox control arrangement. What bothered me most about the DP-1100II was its poor error-correction capability and its tendency to mistrack when attempting to play discs having even the slightest defects. I have to admit that when it played some of my regular CDs, there was no evidence of any mistracking, but then again, I try to keep my discs in good, clean, scratch-free condition. I don't think the average owner of a CD player is as careful.

The continued use of steep analog filtering, especially in a unit priced as high as this one, disturbed me somewhat as well. The audible difference between players employing multi-pole analog filters and those using digital filtration is subtle, and may not make much difference to the average listener. On the other hand, anyone spending the kind of money required to purchase the DP-1100II is not an average listener. In short, I rather wish that Kenwood had placed as much emphasis on internal circuitry design as they did in making sure that the convenience features were up to current standards. *Leonard Feldman*

Play the hits. With no errors.

By now, you're probably familiar with the virtues of compact discs. The wide dynamic range and absence of background noise and distortion. And the playback convenience.

Yet as advanced as the medium is, it's still not perfect.

Which is why you need a compact disc player as perfected as Yamaha's new CD-3.

The CD-3 uses a Yamaha-developed tracking servo control LSI to monitor its sophisticated 3-beam laser pickup. This LSI makes sure that horizontal and vertical tracking accuracy is consistently maintained. And that even small surface imperfections like fingerprints or dust will not cause tracking error and loss of signal.

Even more rigorous servo tracking control is provided by a unique Auto Laser Power Control circuit. Working with the tracking LSI, this circuit constantly monitors the signal and compensates for any manufacturing inconsistencies in the disc itself.

Then we use another Yamaha-developed signal processing LSI that doubles the standard 44.1 kHz sampling frequency to 88.2 kHz. This over-sampling allows us to use a low-pass analog filter with a gentle cutoff slope. So accurate imaging, especially in the high frequency range, is maintained.

We also use a special dual error correction circuit which detects and corrects multiple data errors in the initial stage of signal reconstruction.

So you hear your music recreated with all the uncolored, natural and accurate sound compact discs have to offer.

Another way the CD-3 makes playing the hits error-free is user-friendliness.

All multi-step operations like random playback programming, index search, and phrase repeat are performed with ease. And visually confirmed in the multi-function display indicator.

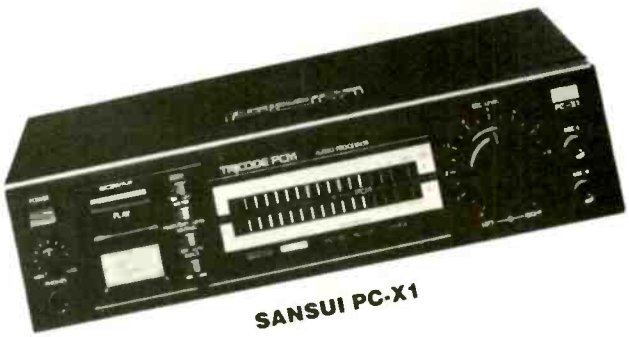
And the wireless remote control that comes with the CD-3 allows you to execute all playback and programming commands with the greatest of ease.

But enough talk. It's time to visit your Yamaha audio dealer and tell him you want to play your favorite music on a CD-3. You can't go wrong.

Yamaha Electronics Corporation, USA, P.O.Box 6660, Buena Park, CA 90622

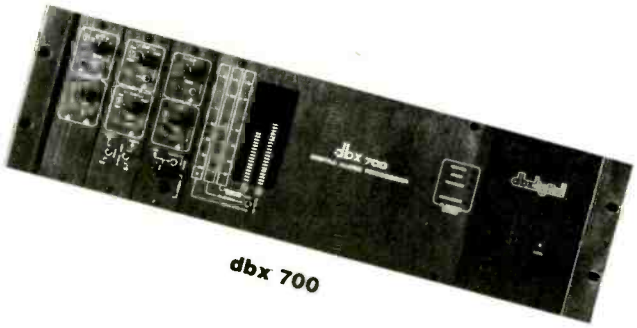
YAMAHA®

DIGITAL PROCESSORS



SANSUI PC-X1

SONY PCM-501ES



dbx 700

TECHNICS SV-100

AIWA PCM-800

VCR SPEED CODE
A—Beta II & VHS SP
B—Beta III & VHS LP or EP

MANUFACTURER	Model	Unit Type: Recorder = R, Processor = P, Both = RP	If Recorder, Tape Format Type	Coding Format	Quantization: No. of Bits; Linear = L, Floating Point = F	Maximum Recording Time, Minutes	VCR Speed Capability—See Code	Frequency Response, Hz to kHz, ± dB	Dynamic Range, dB	Total Harmonic Distortion, %	Inputs: Mike = M, Line = L, Direct Digital = D, Video Composite = V	Outputs: Headphone = H, Line = L, Digital Video = V	Dimensions, Inches	Weight, Lbs.	Price, $	Notes
AIWA	PCM-800	P		EIAJ	14L			2-20 +0.5, -0.7	86	0.007	MLV	HLV	13 x 12⅝ x 2⅛	7.7	650.00	PCM adaptor.
DBX	700	P		dbx CPDM	†		A	10-20 ±0.5	110	0.05	MLD	HLV	19 x 5¼ x 11½	35	††	†Companded Predictive Delta Modulation; ††$4600.00 without mike preamps, $4970.00 with pro levels and connections.
LIRPA LABS	DAWG	RP	†	KGB	2F	6	C	5 & 10	11		MCLX				99.95	†Avco Cartrivision.
NAKAMICHI	DMP-100	P		EIAJ	14L, 16L		A	10-20 ±0.5	†	††	MLV	HLVD	8½ x 3¼ x 12⅛	8⅞	1800.00	†88 dB for 14-bit, 92 dB for 16-bit; ††0.007% for 14-bit, 0.005% for 16-bit; power supply measures 4¼ x 3¼ x 12⅛ inches and weighs 7⅛ pounds.
SANSUI	PC-X1	P		EIAJ	14		B	5-20	86	0.007	MLDV	HLV	10½ x 2⅞ x 11½	5½	1000.00	Battery operated; a.c. adaptor available.
	PC-X11	P		EIAJ	14		B	5-20	86	0.007	LDV	HLV	17 x 2¼ x 12⅜	11	899.00	
SONY	PCM-501ES	P		EIAJ	14L, 16L	480	A/B	5-20 ±0.5	96	0.005	L	HLV	17 x 3¼ x 14⅞	16	750.00	
	PCM-F1	P		EIAJ	14L, 16L	120	A	5-20 ±0.5	96	0.005	ML	HLV	8½ x 3¼ x 12⅛	8¾	1700.00	
TECHNICS	SV-110	P		EIAJ	14L		A/B	2-20 ±0.5	86	0.01	MLDV	HLV	17 x 3 x 14¾	13	800.00	
	SV-100	P	VHS	EIAJ, NTSC	14L	120	A	2-20 ±0.5	86	0.01	MLDV	HLV	9⅜ x 3⅝ x 9⅝	6.4	900.00	Separate power pack.

COMPACT DISC PLAYERS

PIONEER VIDEO CLD-900

ADS CD3

PANASONIC SL-P3610

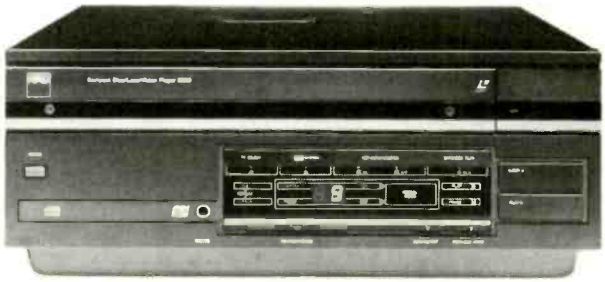
KYOCERA DA-910

MANUFACTURER	Model	Frequency Response, Hz to kHz, ±dB	Dynamic Range, dB	S/N Ratio, –dB	Channel Separation, dB, at 1 kHz	Harmonic Distortion, %, at 1 kHz	Line Output Level, V, Fixed = F	Required (Amplifier Input) Load Impedance, Kilohms	Headphone Output = H, Headphone Output with Level Control = HL	Loading: Front Tilt-Down Door = D, Front Slide-Out Drawer = S, Top = T	Dimensions, Inches	Weight, Lbs.	Price, $	Notes
ADC	CD-100X	10-20 ±0.8	96	95	90	0.004	2F			S	13⅜ x 3⅛ x 11½	8	299.95	Three-beam laser.
ADCOM	GCD-300	5-20 ±0.5	96	98	90	0.004	2.5F			S	17 x 10½ x 3¼	12	499.95	Sound window linear-phase correcting circuit.
	GCD-200	5-20 ±0.5	96	98	90	0.004	2.5F			S	17 x 10½ x 3¼	12	399.95	As above.
ADS	CD3	20-20 ±0.25	96	102	86	0.01	2F		HL	S	17½ x 2¾ x 14¾	20	895.00	
AKAI	CD-M88T	5-20 ±0.5	90	90	85	0.005	0-2	47	HL	S	13.8 x 2.8 x 10	14.3	499.00	
	CD-A7T	5-20 ±0.5	90	90	85	0.005	0-2	47	HL	S	17.3 x 3 x 10	12.8	499.00	
AUDIO-TECHNICA	AT-CD10	5-20 +0.5, -1	95	100	90	0.005	F		HL	S	13⅜ x 3⅝ x 11½	8	399.95	
BANG & OLUFSEN	CD-50	4-20 ±0.3	95	95	94	0.003	2F		None	S	16½ x 3 x 12¾	17.8	999.00	
	CD-X	3-20 ±0.3	96	96	94	0.003	2F		None	T	16½ x 3 x 12¼	13.4	699.00	
CAMBRIDGE AUDIO	CD1	10-20 ±0.5	100	100	100	0.005	0.1-12	47		S	16 x 11 x 5/ 16 x 11 x 3	20/10	1985.00	Mechanism on lead; three separate power supplies.
CARVER	Carver Compact Disc	50-20 ±0.5	96	96	86	0.05	1.9F			S	19 x 3½ x 11¼	13	650.00	Digital Time Lens inc.
DBX	DX3	10-20 +0.5, -1	96		90	0.002	2F	5	None	S	17⅛ x 3¾ x 11½	10	599.00	
DENON	DCD-1000	5-20 ±1	95	95	90	0.004	F		HL	S	13½ x 12 x 3½		360.00	
	DCD-1100	5-20 ±1	95	95	90	0.004	F		HL	S	17½ x 14 x 3½		430.00	
	DCD-1500	5-20 ±0.3	96	96	95	0.0025	F		HL	S	17½ x 14 x 3½		580.00	
	DCD-1800R	5-20 ±0.5	96	96	94	0.003	F		HL	S	19 x 15 x 4½		950.00	Without remote, Model DCD-1800, $800.00.
DISCRETE TECHNOLOGY	LS I	2-20 ±0.3	96	96	98	0.0001	2.0F, 0-2.0	10	None	S	16½ x 3½ x 11⅞	16½	1195.00	
FISHER	AD-823B	20-20	90	90	90						17.3 x 3.4 x 11.3		399.95	
HARMAN/KARDON	HD500	4-20 ±0.5	94	100	83	0.01	0-2.4	10	HL	S	17⅜ x 4 x 13¼	12⅞	600.00	
HITACHI	DA5000	5-20	95	95	92	0.003	2.5F	40		S	12½ x 12⅛ x 3¼	9	300.00	
	DA500	5-20	95	95	92	0.003	2.5F	40		S	17⅛ x 10⅜ x 3¼	10	350.00	
	DA501	5-20	95	95	92	0.003	2.5F	40	H	S	17⅛ x 10⅜ x 3¼	10	450.00	

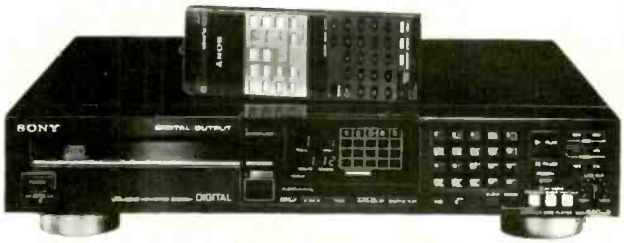
COMPACT DISC PLAYERS

VECTOR RESEARCH VCD-800

DENON DCD-1800R



NAD 5900



SONY CDP-650ESD

MANUFACTURER	Model	Elapsed Time: From Disc Start = D, From Track Start = T, Both = B	Remaining Time: To Disc End = D, To Track End = T, Both = B	Track/Program Selection Number?	Index Display?	Program-Recall Display?	Programmable: Number of Selections; Random = R, Sequential = S	Repeat Functions: Entire Disc = D, Track = T, User-Marked Phrase = P, Index = I, Entire Program = E	Random Access By Time Within Track?	Access by Index Code?	Maximum Access Time, Seconds	Audible Fast Search?	Auto Scan of Track Beginnings?	Remote Control Type: Infrared = I, Wired = W; Gives Confirmation Beep = B	No. of Remote Control Functions	Output Level Control?	Decoding System: 16 Bit = A, 14 Bit Oversampling = B, 16 Bit Oversampling = C	Filtration: Digital = D, Analog = A, Both = B	Notes
		DISPLAY FUNCTIONS						ACCESS FUNCTIONS											
ADC	CD-100X	B	B	Yes	No	Yes	16R	D/T/E	Yes	No	4	Yes	Yes	None		No	A	A	
ADCOM	GCD-300	B	B	Yes	Yes		99R	D/T/P/E				Yes		I			C	D	
	GCD-200	B	B	Yes	Yes			D/T/P/E				Yes		I			C	D	
ADS	CD3	B	B	Yes	Yes	Yes	30R	D/T/P/E	No	Yes	3	Yes	No	Opt., I	All	Yes	C	B	
AKAI	CD-M88T	B		Yes	Yes	Yes	16R	D/T/P/E	No	Yes	2.6	No	No	I	27	Yes	A	A	
	CD-A7T	B		Yes	Yes	Yes	16R	D/T/P/E	No	Yes	2.6	No	No	I	27	Yes	A	A	
AUDIO-TECHNICA	AT-CD10	D		Yes	Yes	Yes	9R	D/T	No	Yes		Yes	No			Yes	C	B	
BANG & OLUFSEN	CD-50	B		Yes	Yes	Yes	34R	D/T/E	No	Yes		No	Yes	I	13	No	C	B	Remote controllable via Beomaster 5000 control panel.
	CD-X	B		Yes	Yes	Yes	40R	D/T/E	No	No		No	No	None		No	B	B	Dual D/A converter.
CAMBRIDGE AUDIO	CD1	T		Yes	Yes		99	D/T/E	No	Yes	2	No		None		Yes	C	A	Three decoders per channel, separate D/A chassis, six selectable filters.
CARVER	Carver Compact Disc	B	D	Yes	Yes	Yes	9R	D/T/E	Yes	Yes		Yes	Yes			No	C	B	
DBX	DX3	B		Yes		Yes	9R	D/T/E	No	Yes	2	Yes	No	None		No	C	B	Over Easy compression, Ambience control, and Digital Audio Impact Restoration circuits.
DENON	DCD-1000	B		Yes	Yes	Yes	9R	D/T/E		Yes	2	Yes	No	†			A	A	†Remote with C7V system.
	DCD-1100	B		Yes	Yes	Yes	9R	D/T/E		Yes	2	Yes	No	I	12		A	A	
	DCD-1500	B	B	Yes	Yes	Yes	20R	D/T/P/E		Yes	2	Yes	No	I	12		†	B	†88.2 kHz, 2× oversampling.
	DCD-1800R	B		Yes	Yes	Yes	15R	D/T/P/E		Yes	2	Yes	Yes	I	12		A	B	
DISCRETE TECHNOLOGY	LS I	B	T	Yes	Yes	Yes	20R	D/T	No	No		No	Yes			Yes	B	B	
FISHER	AD-823B			Yes	Yes					Yes							A		
HARMAN/KARDON	HD500	T		Yes	No	No	15	D/P	No	No		Yes	No	I	10	Yes	C	B	
HITACHI	DA5000	T		Yes	Yes	No	15R	D/T/P/E		Yes		Yes	No			No	A	A	
	DA500	T		Yes	Yes	No	15R	D/T/P/E		Yes		Yes	No			No	A	A	
	DA501	T		Yes	Yes	No	15R	D/T/P/E		Yes		Yes	No	I	18	Yes	A	A	

COMPACT DISC PLAYERS

MANUFACTURER	Model	Frequency Response, Hz to kHz, ±dB	Dynamic Range, dB	S/N Ratio, −dB	Channel Separation, dB, at 1 kHz	Harmonic Distortion, %, at 1 kHz	Line Output Level, V, Fixed = F	Required (Amplifier Input) Load Impedance, kilohms	Headphone Output = H, Headphone Output with Level Control = HL	Loading: Front Tilt-Down Door = D, Front Slide-Out Drawer = S, Top = T	Dimensions, Inches	Weight, Lbs.	Price, $	Notes
JVC	XL-V500B	5-20 +0.5, -1	95	96	90	0.003	2		HL	S	17¼ x 3⅝ x 11¾	13		
	XL-V400B	5-20 +0.5, -1	95	95	90	0.003	2		HL	S	17¼ x 3¼ x 11½	8.9		
	XL-V200B	5-20 +0.5, -1	95	93	90	0.004	2		HL	S	17¼ x 3¼ x 11⅝	8.4		
	XL-V3B	5-20 +0.5, -1	95	96	90	0.0035	2			S	13⅜ x 3¾ x 11⅝	9.7	450.00	
KENWOOD	DP-1100II	2-20 ±0.5	95		90	0.0015	2.0F		HL	S	17⅜ x 12¼ x 3½	15	725.00	
	DP-900	4-20 ±0.5	95		90	0.002	2.0F		HL	S	17⅜ x 12¼ x 3½	13.2	510.00	
	DP-840	5-20 ±0.5	96		90	0.003	2.0F		HL	S	16⅝ x 12⅛ x 3¼	10.5	395.00	
KINERGETICS	KCD-1	2-20	100	100	94	0.003	0-2.0	5		S	19 x 3¾ x 15	25	850.00	Separate power supply.
KYOCERA	DA-910	5-20 ±0.5	90	95	90	0.005	Sel.	1	H	S	17 x 15½ x 13	22	1600.00	
	DA-810	5-20 ±0.5	90	95	90	0.005	Sel.	1	H	S	18⅛ x 4 x 12⅛	18¼	950.00	
	DA-610	5-20 ±0.5	90	90	90	0.005	2.0F	1	HL	S	18⅛ x 3¼ x 12⅛	18	550.00	
	DA-01	20-20 ±0.5	90	90	90	0.005	0-2.0	0.5		D	18¼ x 5¼ x 12⅝	18½	1050.00	
LIRPA LABS	LSD	4-37 ±23	25	34	No	1.8	0-90F			TS	36 x 42 x 30	180	300.00	With electronics, $4300.00.
LUXMAN	D404	5-20 ±0.5	96	96	90	0.003	2F			S	17⅞ x 3⅜ x 12⅜	13.2	500.00	
	D405	5-20 ±0.5	96	96	90	0.003	2F			S	17⅞ x 3⅜ x 12⅜	13.2	600.00	
	D408	5-20 ±0.5	96	96	90	0.003	2F		HL	S	16⅝ x 6⅝ x 17⅝	34.7	1300.00	CD/LaserVision player.
	DO3	5-20 ±0.5	97	97	93	0.003	2F			S	17⅞ x 3⅜ x 13	13.3	1500.00	
MAGNAVOX	FD1040	20-20 ±0.15	105	96	94	0.003	2F	10		S	12½ x 11¾ x 3½	20	289.99	
	FD2040SL	20-20 ±0.15	105	96	94	0.003	2F	10	H	S	16½ x 11¾ x 3½	25	299.99	
	FD3040SL	20-20 ±0.15	105	96	94	0.003	2F, 0-2	10	H	S	16½ x 11¾ x 3½	35	449.00	
	FD1041BK	20-20 ±0.15	105	96	94	0.003	2F	10		S	12½ x 11¾ x 3½		289.99	
	FD1051BK	20-20 ±0.15	105	96	94	0.003	2F	10		S	12½ x 11¾ x 3½		349.99	
	FD2041SL	20-20 ±0.15	105	96	94	0.003	2F	10	H	S	16½ x 11¾ x 3½		299.99	
MARANTZ	CD150	5-20		96	90	0.005	2			S	4 x 16½ x 11⅝	9.5	399.95	
	CD74	4-20		96	90	0.004	2		H	S	3⅜ x 16⅜ x 11⅞	17.9	599.95	
McINTOSH	MCD7000	20-20 ±0.3	96	96	94	0.003	2F, 0-2	5	HL	S	16 x 5½ x 13	22	1399.00	
MELOS AUDIO	CD-1	20-20 ±0.3	90	90	90	0.004	2.0F	10		S	16½ x 12 x 3½	17	850.00	
MERIDIAN	MCD	20-20 +0, -0.3	90	90	90	0.004	2F	1		T	12.8 x 3 x 10.7	11	699.00	
MISSION ELECTRONICS	DAD7000R	20-20 ±0.3	95	95	95	0.004	2.0F	10		S	12.6 x 3.4 x 11.4	15½	749.00	
MITSUBISHI	DP107	5-20 ±0.5	95		90	0.003	2F		HL	S	16⅞ x 11⅜ x 3⅜	9.3	280.00	
NAD	5900	5-20 ±0.5	96	96	94	0.003		0.6	HL	S	16½ x 17⅝ x 6⅝	34½		CD/LaserVision player.
	5355	20-20 ±1	97	97	84	0.0058	1.8F	2.5	None	S	16½ x 12½ x 3¼	10½	498.00	
NAKAMICHI	OMS-7	5-20 ±0.5	92	92	92	0.003	2.0F		HL	S	17⅛ x 3⅞ x 12⅛	16⅝	1295.00	
	OMS-5	5-20 ±0.5	92	92	92	0.003	2.0F			S	17⅛ x 3⅞ x 12⅛	16⅝	995.00	
NEC	CD-509E	5-20 ±0.5	90	95	86	0.005	2F	1	HL	S	16⅞ x 3½ x 12⅝	11	449.00	
	CD-607E	5-20 ±0.5	90	95	90	0.005	2.5F	1	HL	S	16⅞ x 3½ x 12⅝	11	599.00	
	CD-705E	5-20 ±0.5	90	95	90	0.005	2.5F	1	HL	S	17 x 4¾ x 14¼	22.7	749.00	
NIKKO	NCD-100	5-20 ±0.5	96	92	90	0.003	2F	50	HL	S	17.3 x 3.6 x 12.2	12.3	399.00	
	NCD-200	10-18 ±0.5	96	92	90	0.003	2F	50	HL	S	17.3 x 3.7 x 11.4	10	599.00	
	NCD-600 Changer	10-20 ±0.5	96	85	90	0.007	Var.	50	H	†	18.6 x 14.6 x 13.7	60	1799.00	Programmable, automatic changer; †tray holds 60 discs.
ONKYO	DX-200	2-20 ±0.5	96	96	93	0.003	2.0F, 0-2		HL	S	17⅛ x 13¾ x 4	13⅛	599.95	
	DX-150	10-20 ±2	93	93	87	0.005	2.0F			S	17⅛ x 13¾ x 3⅝	11	364.95	
PANASONIC	SL-P3610	4-20 ±0.5	96	96	100	0.002	2.0F		None	S	16⅞ x 3¼ x 12⅝	11.2	374.95	
PARASOUND	CDP-900	20-20 ±0.2	102	102	95	0.003	0-2.0	10	H	S	17¼ x 10 x 4	14	349.95	Less than 10° phase shift at 20 kHz.
PIONEER ELECTRONICS	PD-7010BK	2-20 ±0.5	95	96	93	0.0015	2F		HL	S	16⅝ x 3⅝ x 12¼	10.6	459.95	
	PD-6010BK	2-20 ±0.5	95	96	93	0.002	2F		H	S	16⅝ x 3⅝ x 12¼	10.6	349.95	
	PD-5010BK/ PD-5010	2-20 ±0.5	95	96	93	0.002	2F		H	S	16⅝ x 3⅝ x 12¼	10.6	299.95	
	P-DX700	5-20	93	95	93	0.0045	2F			S	12⅝ x 3⅞ x 10¼	10.2	539.95	
	PD-9010XBK	2-20 ±0.3	96	98	95	0.001	2F		HL	S	18 x 3¾ x 12¼	12.8	539.95	

COMPACT DISC PLAYERS

MANUFACTURER	Model	Elapsed Time: From Disc Start = D, From Track Start = T, Both = B	Remaining Time: To Disc End = D, To Track End = T, Both = B	Track/Program Selection Number?	Index Display?	Program-Recall Display?	Programmable: Number of Selections; Random = R, Sequential = S	Repeat Functions: Entire Disc = D, Track = T, User-Marked Phrase = P, Index = I, Entire Program = E	Random Access By Time Within Track?	Access by Index Code?	Maximum Access Time, Seconds	Audible Fast Search?	Auto Scan of Track Beginnings?	Remote Control Type: Infrared = I, Wired = W, Gives Confirmation Beep = B	No. of Remote Control Functions	Output Level Control?	Decoding System: 16 Bit = A, 14 Bit Oversampling = B, 16 Bit Oversampling = C	Filtration: Digital = D, Analog = A, Both = B	Notes
JVC	XL-V5008	B	B	Yes	Yes		15R	D/T/P/E				Yes	Yes	I	16			B	
	XL-V4008	B	B	Yes	Yes		15R	D/T/P/E				Yes	Yes	I	16			B	
	XL-V2008	B	B	Yes	No		15R	D/T				Yes						B	
	XL-V38	B	B	Yes	No		8R	D/T				Yes						B	
KENWOOD	DP-1100II	B	O	Yes	Yes	Yes	16R	D/E		Yes	4	Yes	Yes	I	24	Yes	A	B	
	DP-900	B	D	Yes	Yes	Yes	16R	D/E			4	Yes				Yes	A	B	
	DP-840	B	O	Yes	No	Yes	8R	D/E			4	No				Yes	A	B	
KINERGETICS	KCD-1	T	No	Yes	No	Yes	20R	E	No	No	3	Yes	No	I	9	Yes	C	D	
KYOCERA	DA-910	T	D	Yes	Yes	Yes	24R	D/E	No	Yes	3.5	Yes	No	I	8	Yes	C	B	
	DA-810	T	D	Yes	Yes	Yes	24R	D/E	No	Yes	3.5	Yes	No			Yes	C	B	
	DA-610	T	D	Yes	No	Yes	16	D/E	No	No	4	Yes	No	I/B	8	No	A	A	
	DA-01	B	B	Yes	Yes	Yes	24R	T/P/E	Yes	Yes		No	No			Yes	C	B	
LIRPA LABS	LSD	†			††		41	E	No	Yes	99			B	2				†From 1 AD; ††card-file.
LUXMAN	D404	D	B	Yes	Yes	Yes	8R	D/T/E	No	No		Yes	No	†	4	No	A	A	†Remote with Luxman R406.
	D405	B		Yes	Yes	No	1S	D/P	No	Yes		Yes	No	None		No	A	A	
	D408	D		Yes	No	Yes	1R	D/T/P	Yes	No		Yes	No	I	22	No	A	A	
	D03	B	B	Yes	Yes	Yes	20R	D/T/E	No	Yes		No	Yes		7	No	A		
MAGNAVOX	FD1040	T		Yes	No	Yes	20R	D/T/E	No	No	6	No	No			No	B	B	
	FD2040SL	T		Yes	No	Yes	20R	D/T/E	No	No	6	No	No			No	B	B	
	FD3040SL	T	B	Yes	Yes		24R	D/T/P/E	Yes	Yes	10	No	Yes	I	9	Yes	B	B	
	FD1041BK	T		Yes	Yes	Yes	20R		No	No	3	Yes	No	Opt., I	8	No	B	B	
	FD1051BK	T		Yes	Yes	Yes	20R		No	No	3	Yes	No	I	8	No	B	B	
	FD2401SL	T		Yes	Yes	Yes	20R	D/T/E	No	No	3	Yes	No	Opt., I	8	No	B	B	
MARANTZ	CD150	T		Yes	No	No	16R	D/T/P/E	No	No		Yes	No			No	A	D	
	CD74	T	D	Yes	Yes	Yes	24R	D/T/P/E	No	Yes		No	Yes			Yes	B	O	
McINTOSH	MCD7000	B		Yes	Yes	Yes	21R	D/T/E				No	Yes	I	13	Yes	C	B	
MELOS AUDIO	CD-1	B	T	Yes	Yes	Yes	20R	D/T/E	No	No		No	No	None		No	C	B	
MERIDIAN	MCD	No	No	Yes	No	Yes	15R	D/T/E	No	No	8	No	No	None		No	B	B	
MISSION ELECTRONICS	DAD7000R	T	No	Yes	No	Yes	20R	D/T/E	No	No	2.5	No	No	I	9	No	C	B	
MITSUBISHI	DP107	T		Yes	Yes	Yes	9R	D/E				Yes	No				A		
NAD	5900	B	B	Yes	Yes	Yes		D/T	Yes		4	No	No	I	28	No	C	A	
	5355	B	B	Yes	No	Yes	8R	D	No	Yes	2	Yes	No	I	6	No	A	B	
NAKAMICHI	OMS-7	T	B	Yes	Yes	Yes	24R	D/E		Yes		Yes	No	I	7		B†	B	†4 × oversampling.
	OMS-5	T	B	No	No	No	No	D		No		Yes	No				B†	B	
NEC	CD-509E	T		Yes	Yes	Yes	15R	D/T/P/E	No	No	3	Yes	No	None		No	C	B†	†High-speed C-MOS D/A switching, five-pole active low-pass filter.
	CD-607E	B	B	Yes	Yes	Yes	15R	D/T/E	No	No	3	Yes	No	I	10	No	C	B†	
	CD-705E	B	B	Yes	Yes	Yes	15R	D/T/E	Yes	No	3	Yes	No	I	12	No	C	B†	
NIKKO	NCD-100	B	O	Yes	Yes	Yes	S	D/T/P	No	Yes	2					No	A	B	
	NCD-200	B	B	Yes	Yes	Yes	15R	D/T/P	Yes	Yes	2			I	9	No	C	B	
	NCD-600 Changer	B	B	Yes	Yes	Yes	50R	D/T/P	Yes	Yes				Opt., I		Yes	C	B	
ONKYO	DX-200	T	B	Yes	Yes	Yes	16R	D/T/P/E	No	Yes	2	Yes	No	I	13	Yes	C	B	Three-beam laser.
	DX-150	T	T	Yes	No	Yes	16R	D/T/E	No	No	3	No	No			No	C	B	Single-beam laser.
PANASONIC	SL-P3610	T	No	Yes	Yes	No	15R	D/T/E	No	Yes		Yes	No	None		No	A	A	
PARASOUND	CDP-900	B	D	Yes	Yes	Yes	S	D			2	Yes				Yes	A	B	
PIONEER ELECTRONICS	PD-7010BK	T	D	Yes	Yes	Yes	32R	D/T/E		Yes		Yes	Yes	I	13			A	
	PD-6010BK			Yes			27R	D/T/E				Yes	Yes	I	9			A	
	PD-5010BK/ PD-5010			Yes			27R	D/T/E				Yes	Yes		9			A	
	P-OX700	T	D	Yes	Yes	Yes	10R	D/T/P/E				Yes	Yes					A	
	PD-9010XBK	T	D	Yes	Yes	Yes	32R	D/T/E		Yes		Yes	Yes	I	13			D	

COMPACT DISC PLAYERS

MANUFACTURER	Model	Frequency Response, Hz to kHz, ±dB	Dynamic Range, dB	S/N Ratio, –dB	Channel Separation, dB, at 1 kHz	Harmonic Distortion, %, at 1 kHz	Line Output Level, V; Fixed = F	Required (Amplifier Input) Load Impedance, Kilohms	Headphone Output = H, Headphone Output with Level Control = HL	Loading: Front Tilt-Down Door = D, Front Slide-Out Drawer = S, Top = T	Dimensions, Inches	Weight, Lbs.	Price, $	Notes
PIONEER VIDEO	CLD-900	5-20 ±0.5	96	96	94	0.003	0.2F		HL	S	16½ x 17⅝ x 6⅝	34½	1200.00	CD/LaserVision player.
PS AUDIO	CD-I	20-20 ±0.3	90	90	90	0.004	F	10	None	S	19 x 12 x 3	18	690.00	
QUASAR	CD8975YE CD8975YW	4-20 ±0.5 4-20 ±0.5	96 96	96 96	90 90	0.003 0.003	F F			S S	4⅛ x 18¼ x 12⅝ 4⅛ x 18¼ x 12⅝	11 17	399.95 434.95	
REALISTIC	CD-1200 (42-5002) CD-2000 (42-5001)	5-20 +0.5, -1 5-20 +0.5, -1	90 90	92 88	90 90	0.004 0.004	2F 1.8F	10 47		S S	14 x 10½ x 2⅞ 12⅝ x 12 x 3⅜	10 8½	299.95 259.95	
REVOX	B225	20-20 +0, -0.6	96	100	90	0.006	2F, 0-2	47	HL	S	18 x 13¼ x 4⅜	18¾	1150.00	
RDTEL	RCD-850	20-18 ±1		90	80	0.03	2F			S	17 x 10½ x 3¼		395.00	
SANSUI	PC-V750 PC-V100	5-20 5-20	95 95		90 90	0.003 0.003	2 2			S S	17 x 3⅛ x 12⅛ 13⅝ x 3⅝ x 11⅜	10.7 7.9	350.00 350.00	
SANYO	CP660	5-20	96	92	92	0.0025	2F	47	HL	S	16½ x 10⅝ x 3⅛	7⅜	299.95	
H. H. SCOTT	959DA	3-20 +0.5, -1		98	90	0.002			HL	S		10½	500.00	
	949DA	5-20 ±0.5		95		0.003				S		10	400.00	
SEARS ROEBUCK	9751 9752	20-20 ±1 20-20 ±1	90 90	90 90	90 90	0.015 0.015	2.0 2.0	10 10	H H	S S	16½ x 10⅝ x 2⅞ 16½ x 10⅝ x 2⅞	11 11	250.00 250.00	
SHARP	DX-600 DX-100	5-20 ±0.5 5-20 ±0.5	96 96	96 96	90 90	0.005 0.005	2.0 2.0	10 10	H H	S S	17 x 3⅛ x 11¾ 13 x 3⅛ x 11¾	11.7 10.4		
SHERWOOD	CDP-200 CDP-220	6-20 ±0.5 6-20 ±0.5	96 96	100 100	90 90	0.2 0.2	2.0F 2.0F	1 1	HL HL	S S	17⅜ x 3¾ x 11¾ 17⅜ x 3¾ x 11¾	9⅜ 10	399.95 499.95	
SONY	D-5	5-20 ±0.5	90	85	85	0.008	2F		HL	T	5 x 1½ x 5¼	1⅜	299.95	Portable; battery pack and case opt.
	COP-7F	2-20 ±0.5	90	90	90	0.004	2F		HL	T	8½ x 3⅛ x 12	9	299.95	
	COP-30	2-20 ±0.5	90	90	90	0.004	2F			S	14 x 2⅞ x 11	9	330.00	
	CDP-70	2-20 ±0.5	90	90	90	0.004	2F		HL	S	17 x 2⅞ x 12	9	350.00	
	CDP-102	2-20 ±0.5	96	96	95	0.003	2F			S	14 x 3⅛ x 13¼	13	450.00	
	CDP-302	2-20 ±0.5	96	96	95	0.003	2F		HL	S	17 x 3⅛ x 13¼	15	550.00	
	CDP-520ES	2-20 ±0.3	96	96	95	0.003	2F		HL	S	17 x 3⅛ x 13¼	15	600.00	
	CDP-620ES	2-20 ±0.3	96	96	95	0.0025	2F, 0.05-2		HL	S	17 x 3⅛ x 14	20	950.00	
	COP-650ESD	2-20 ±0.3	96	96	95	0.0025	2F, 0.05-2			S	17 x 3⅛ x 14	20	1300.00	
SYLVANIA	FDD104SL	20-20 ±0.15	105	96	94	0.003	2F	10		S	12½ x 11¾ x 3½		449.95	
	FDE203SL	20-20 ±0.15	105	96	94	0.003	2F	10	H	S	16½ x 11¾ x 3½		259.00	
SYMPHONIC	CD100	10-18	90	92	86	0.006	2F	100		S	13⅞ x 11⅝ x 3⅛	10	180.00	
TEAC	PD 22	5-20	95		90	0.003	F	50k	None	S				
	PD 300	5-20	95		90	0.003		50k	None	S				
	PD 500	3-20	96	96	95	0.0015	2F	50k	HL	S	17⅛ x 3⅝ x 11⅜	10⅝		
TECHNICS	SL-XP7	4-20 +0.5, -1	90	90	90	0.006	2.0F		HL	T	5⅜ x 2¼ x 6	1.5	299.00	Portable.
	SL-P1	4-20 ±0.5	96	96	100	0.0015	2.0		None	S	17 x 3¼ x 13⅛	11.2	400.00	
	SL-P2	4-20 ±0.5	96	96	100	0.0015	2.0		HL	S	17 x 3¼ x 13⅛	11.5	500.00	
	SL-P3	40-20 ±0.5	96	96	100	0.0015	2.0F, Var.		HL	S	17 x 3¼ x 13⅛	11.5	600.00	
TOSHIBA	XR-40	5-20 ±0.5	96	96	90	0.005	2.0F, 0-2.0	50	HL	S	16½ x 12⅛ x 3⅜	10.6	399.00	
	XR-V11	5-20 ±0.5	96	96	90	0.005	2.0F	50		S	13⅜ x 12⅛ x 3⅜	9	399.00	
	XR-V22	5-20 ±0.5	96	96	90	0.005	2.0F	50		†	13⅜ x 14¼ x 4⅜	13.4	499.00	†Two slide-out drawers, continuous play.
ULTRX	CP400	5-20	96	92	92	0.003	2F	47	HL	S	16½ x 12⅝ x 3½	14	599.95	
VECTOR RESEARCH	VCD-800	5-20 ±0.5	95	95	86	0.005				S	17 x 12½ x 3½	11	350.00	
YAMAHA	CD-2	3-20 +0.5, -1	96	102	95	0.0015	2.0F	100		S	17⅛ x 11⅜ x 3⅝	10½	599.00	
	CD-3	3-20 +0.5, -1	96	100	90	0.002	2.0F	100	HL	S	17⅛ x 11⅜ x 3⅝	9¾	499.00	
	CD-37	3-20 +0.5, -1	96	100	90	0.002	2.0F	100	HL	S	17⅛ x 11⅜ x 3⅝	9¾	449.00	
	CD-X2	5-20 +0.5, -1	95	100	90	0.003	2.0F	100	HL	S	13⅜ x 11½ x 3⅝	7¾	299.00	

COMPACT DISC PLAYERS

		DISPLAY FUNCTIONS								ACCESS FUNCTIONS											
MANUFACTURER	Model	Elapsed Time: From Disc Start=D, From Track Start=T, Both=B	Remaining Time: To Disc End=D, To Track End=T, Both=B	Track Program Selection Number?	Index Display?	Program-Recall Display?	Programmable: Number of Selections; Random=R, Sequential=S	Repeat Functions: Entire Disc=D, Track=T, User-Marked Phrase=P, Index=I, Entire Program=E	Random Access By Time Within Track?	Access by Index Code?	Maximum Access Time, Seconds	Audible Fast Search?	Auto Scan of Track Beginnings?	Remote Control Type: Infrared=I, Wired=W, Gives Confirmation Beep=B	No. of Remote Control Functions	Output Level Control?	Decoding System: 16 Bit=A, 14 Bit Oversampling=B, 16 Bit Oversampling=C	Filtration: Digital=D, Analog=A, Both=B	Notes
PIONEER VIDED	CLD-900	T	D	Yes	Yes	No		D/T/P		Yes		Yes	No	I		No	A	A	
PS AUDID	CD-I	B	T	Yes	Yes	Yes	20R	D/T/E	No	No		No	No	None		No	B	B	
QUASAR	CD8975YE CD8975YW	T T	No No	Yes Yes	Yes Yes	No No	15R 15R	D/T D/T	No No	Yes Yes		Yes Yes	No No			No No	A A	A A	
REALISTIC	CD-1200 (42-5002) CD-2000 (42-5001)	T T	No D	Yes Yes	Yes Yes	Yes Yes	16 15	D/P/E D/T/E	No No	No Yes	3 2	Yes Yes	Yes Yes	None None		No No	A A	A A	
REVDX	B225	B		Yes	Yes	Yes	19R	D/T/P/E	Yes	Yes	3	No	Yes	I/W	6	Yes	B	B	Digitally generated 1-kHz calibration tone, remote access to serial bus.
ROTEL	RCD-850			Yes	Yes		9R												
SANSUI	PC-V750 PC-V100	B B	T No	Yes Yes	Yes Yes	Yes Yes	8R 9R	D/T D/T/P	No No	Yes Yes	2 3	Yes Yes	No No	None None		No No	A A	B B	
SANYD	CP660	T	D	Yes	Yes	Yes	16R	D/T/P	Yes	Yes	2	Yes	No	None		No	A	A	
H. H. SCDTT	959DA 949DA	B B	B B	Yes Yes	Yes Yes	Yes Yes	99R 23R	D/T/P D/T/P	No No	Yes Yes	2 2	Yes No	No No	I		Yes Yes	A A	D D	
SEARS RDEBUCK	9751 9752	No No	No No	Yes Yes	No Yes	No No	15R 15R	T T	No No	No No		No No	No No	None None		No No	C C	D D	
SHARP	DX-500 DX-100	D D		Yes Yes	No No	Yes Yes	15R 15R	D/T D/T	No No	No No	6 6	Yes Yes	No No	None None		No No	A A	D D	
SHERWDDD	CDP-200 CDP-220	B B		Yes Yes	Yes Yes	Yes Yes	9R 9R	D/T/P D/T/P	No No	Yes Yes		Yes Yes	No No	I	All	No No	A A	B B	
SDNY	D-5 CDP-7F CDP-30 CDP-70 CDP-102 CDP-302 CDP-520ES CDP-620ES CDP-650ESD	T T T T T T T B B	D D D D D D D B B	Yes Yes Yes Yes Yes Yes Yes Yes Yes	No No Yes No Yes No Yes Yes Yes	No Yes No Yes No Yes Yes Yes Yes	16R 16R 16R 16R 20R 20R	D/T/P/E D/T/P D/P/E D/T/P D/T/P/E D/T/P/E D/T/P/E D/T/P/E	No No No No No No No No No	No No Yes No Yes Yes Yes Yes Yes	4 4 4 4 1 1 1 1 1	Yes Yes Yes Yes Yes Yes Yes Yes Yes	No No No No No No No No No	Opt., I Opt., I I I I I	9 9 11 11 11 15 15	No No No No No No Yes Yes	A A A A C C C C	A A A A D D D D	Subcode output. As above. As above. As above. As above, digital output stage.
SYLVANIA	FDD104SL FDE203SL	T T		Yes Yes	No Yes	Yes Yes	20R 20R	D/T/E D/T/E	No No	No No	6 3	No Yes	No No	Opt., I	8	No No	B B	B B	
SYMPHONIC	CD100	T	No	Yes	Yes		16R	D/T/E	Yes	No	2	Yes	No				A	B	
TEAC	PD 22 PD 300 PD 500	D D B	D D B	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	15R 15R 15R	D/T/P D/T/P D/T/P	No No No	Yes Yes Yes	2 2 2	Yes Yes Yes	No No No	None None I	 11	No No No	A A A	B B B	
TECHNICS	SL-XP7 SL-P1 SL-P2 SL-P3	T T T T	D D	Yes Yes Yes Yes	No Yes Yes Yes	Yes No No Yes	15S 15R 15R 15R	D/E D/E D/T/P/E D/T/P/E	No No No No	No Yes Yes Yes	 3	Yes Yes Yes Yes	No No Yes Yes	None I I	 13 	No No No Yes	A A A A		
TOSHIBA	XR-40 XR-V11 XR-V22	D D D	D D D	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	8R 8R 30S	D/T/E D/T/E D/T/E	No No No	No No No	3 3 3	No No No	No No No	None None None		Yes No No	A A A	A A A	
ULTRX	CP400	T	D	Yes	Yes	Yes	16	D/T/P	Yes	Yes	2	Yes	Yes	Opt., I	10	No	A	A	
VECTOR RESEARCH	VCD-800	T		Yes	Yes	Yes	15R	D/T/P/E	No	Yes		Yes					C	D	
YAMAHA	CD-2 CD-3 CD-37 CD-X2	B B B B	B T T T	Yes Yes Yes Yes	Yes Yes Yes Yes	Yes Yes Yes Yes	12R 9R 9R 9R	D/T/P/E D/T/P/E D/T/P/E D/T/P/E		Yes No No No	3 3 3 3	Yes Yes Yes Yes		I I	8 12	No No No No	C C C C	B B B B	

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Afternoon in Paris: Stephane Grappelli
MPS 821 865-2.

Stephane Grappelli, the grand old man of the French jazz violin, carries on a tradition that flourished in the '30s. His jaunty, angular musical personality, suave style, and gentle humor pervade this disc.

"Chicago" is a good example of his charming, slightly irreverent approach. With his first note, he introduces those characteristic rhythmic discrepancies which are a basic part of his musical vocabulary. He plays games with the steady background beat, coyly holding a note too long or hesitating before starting a note, then jumping back onto the beat and continuing—with impish charm—as if nothing had happened.

Melodically, he likes to interpolate small leaps between the main notes of a familiar tune, gleefully confusing you, and then returning to the tune somewhere in the middle of a phrase.

In "Autumn Leaves," Grappelli uses an unexpectedly rapid tempo, which turns out to be just casually fast when he settles into a happy, shuffling pace. After about a minute, he begins to decorate the melody with rapidly swirling, scalar passages. His special trick is to give an extra little emphasis, off the beat, to individual notes in the main melody.

Later on, listen to Eberhard Weber's bass solo. You'll hear a few clues in this 1971 recording as to where Weber's musical development would go. Occasional pitch bends and sliding tones hint at the inventive musical mind that would emerge and bring us *Yellow Fields* in 1976. Sitar technique (i.e., a phrase of sliding notes after a single pluck of a string) already had started to influence him.

The sound quality on this disc is only average for the period. The piano transients have far too much overload distortion. In 1971, that amount of distortion was avoidable, and a mistake when it occurred. Also, the violin often interacts with the reverb, producing a harsh sound that could have been avoided. Producer Willi Fruth and engineer Rolf Donner get low marks for not taking greater care with this.

Fruth keeps the ensemble nailed in place on his imaginary stage, as if he were recording a tableau, not a play. The drums are a single unit on the right, and the violin, bass, and piano are clustered together near the center, as they would appear in a live performance. The image has a slight sense of depth but seems basically two-dimensional—fairly typical for the period.

Fruth loves his compressors. Whenever the music gets soft, his compressor moves in for a "close-up shot" that keeps the level constant. Listen to "Tangerine" when the violin drops out to let the piano take a solo. You'd expect the level to decrease, but it doesn't. Worse, the metallic distortion on the piano doesn't sound any better when it's closer.

The booklet includes photos of the four musicians, but there is nothing on the inside or outside that might help younger generations of listeners to discover the elegant charm of Grappelli's playing. For those who already know, the disc is a nice document of his 1971 style.

Steve Birchall

Hot House Flowers: Wynton Marsalis
CBS CK 39530.

Listening to *Hot House Flowers* is like watching a bouquet of delicate tropical blossoms open up and reveal their intricate structures and subtle fragrances. Each track demonstrates the expressive control that Wynton Marsalis et al. have over every parameter of sound—from dynamics, timbre, attacks and articulations to style.

At the same time, the musicians expand the range of these microscopically graduated scalings, taking every sound to the limits of their technique. Paradoxically, this intensely disciplined attention to detail brings a wide variety of sounds and precisely expressed emotions to the music. Producer Steven Epstein plays his instrument (the recording studio) with equal artistry, enhancing the communicative power of the album.

"Django" begins with ghostly, widely spaced sounds in the bass, plus trumpet and closely spaced chords in the high woodwinds. Listen for the continuously changing timbre Ron Carter gets on the sustained bass. He does it by slowly lessening the firmness of the string against the fingerboard to get a slight breakup of the tone.

The title track, composed by Marsalis, shows off the sonic subtlety of the CD in two wonderfully *musical* ways. In the introduction, a fast diminuendo and precisely terraced dynamic levels sound so naturally live that they almost pass by unnoticed. Later, in the series of solos on trumpet, flute, sax and acoustic bass, you can hear with unaccustomed clarity all the nuances of phrasing and attacks these musicians have at their disposal.

The pastel bouquets of sounds in Robert Freedman's arrangements explore the potentials of the CD medium still more effectively. In "Hot House Flowers" the accompaniment has a complex, multi-level texture. The bottom layer is a plucked pedal tone, plus an intricate acoustic bass figure of virtuosic difficulty played with ease by Carter. Over this, Jeffrey Watts adds a rhythmic figure played on hi-hat and suspended cymbals, extracting an astonishing variey of colors from his instruments. Finally, Kenny Kirkland on piano plays chords in ever-changing patterns—groups of two or three or one, staccato and sustained, with pedal and without.

Epstein gives each of these layers its own acoustic environment, a polyphony of ambiences that complements the arrangement's complexity. Sometimes he plays with these acoustic microworlds as if they were instrumental effects. At the end of the sax solo, the reverb on the drums gradually increases by imperceptible degrees. This opens up the sound, giving the effect of a movie camera receding for a long shot of the entire ensemble. It provides a moment of relaxation before the jump back to the close-up of the soloist. With all this going on, you still have to listen to the incredible solos, the main features of the song.

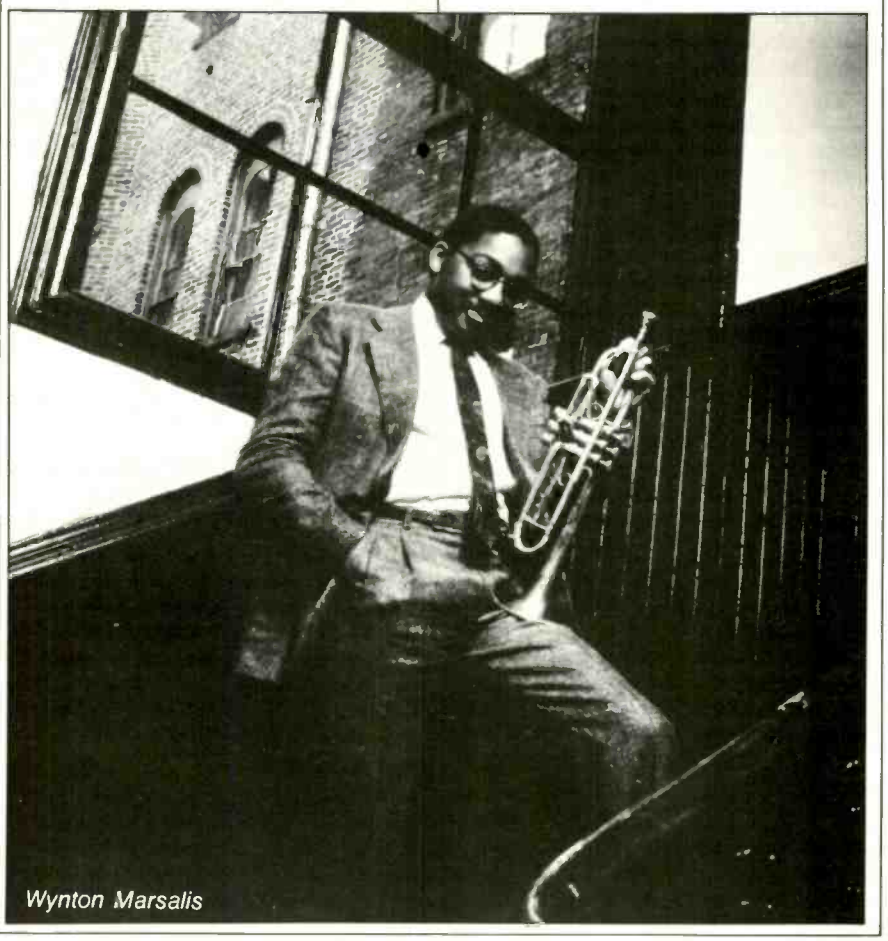
Hot House Flowers represents an intensely intellectual, tightly controlled approach to jazz. Within that structure, Marsalis and friends have the freedom to improvise and to explore its furthest reaches with emotion and depth. Epstein's production presents these tropical blooms in thoughtfully designed acoustic settings. *Steve Birchall*

Days Like These: Jay Hoggard
GRP D-9516.

Sound: C+ Performance: C-

Jay Hoggard is a skilled and underrecorded artist who polished his vibraphone with some of the seminal figures of New York's mid-'70s and early-'80s jazz scene. Chico Freeman, Anthony Davis and Clifford Thornton benefited from his colorations. He can exude the warmth of Milt Jackson, or the speed and complexity of Gary Burton, but also a tribal earthiness and power that is strictly his own. That presence can be heard on this 1979 recording, if you want to sift through producer Dave Grusin's clichéd funk arrangements.

"Samba Pa Negra" opens the disc



Wynton Marsalis

Days Like These is not a typical Jay Hoggard work. Mixed to the middle of the dynamic range, it wasn't meant to excite but to serve as background.

with a pleasant Latin shuffle and a playful theme, with Hoggard's vibes doubled by Dave Valentin on flute. Hoggard breaks out of the head like he's champing at the bit and launches a fleet, melodic improvisation, a Herculean effort considering Grusin's wooden comping at the keyboard.

The string arrangements on most of the pieces were added as an afterthought, lifted from "String-Sweetening Book #1." Background choruses appear out of place. On the ballad "We Got By" they sound like they were sung through surgical masks. Chico Freeman, who can elevate the most mundane recordings, has trouble rising up to a slow burn on "Brown Lady with the Braids." Only percussionist Nana Vasconcelos seems oblivious to the mediocrity around him as he percolates and hums his talking drum solo on "West End Dancer."

Simply put, *Days Like These* is an atypical recording for Hoggard, who is heard to much better effect on his 1982 recording, *Mystic Winds, Tropic Breezes* (India Navigation). It's definitely an unsatisfying exercise for a CD player. The analog master is brisk and clear and GRP did a fine job on the digital mastering transfer, but it's all mixed to the middle of the dynamic range. After all, this record wasn't meant to excite; it's only sophisticated background noise. *John Diliberto*

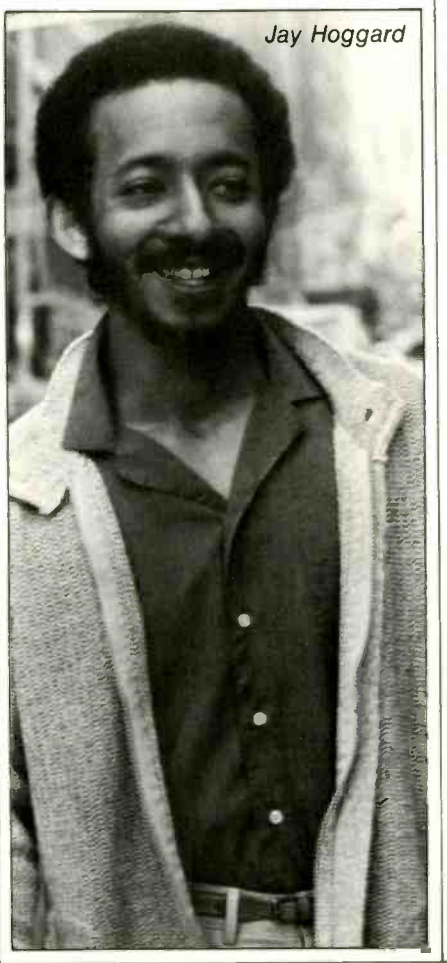
Prokofiev: Symphony No. 5. The Saint Louis Symphony Orchestra, Leonard Slatkin.
RCA RCD1-5035.

This CD of Prokofiev's monumental Fifth Symphony is clear vindication of the talents of Paul Goodman, recording engineer for RCA Records. As a matter of fact, it won this year's Grammy award for best engineering of a classical recording.

Paul used the Soundstream digital recorder, and his basic mike setup was three Schoeps omnis in a spaced array, with a few other Schoeps mikes as discreet sweeteners for various orchestral choirs. These fed into a Neve console, and thence to the Soundstream recorder.

Paul has done a fine job in capturing the massive sonorities of this score, in a high-definition recording that is well-balanced in the warm ambience of Powell Symphony Hall in St. Louis. The sound is immaculately clean, which serves well in the delineation of this music, sections of which can be almost turgid in their great orchestral weight. This is an exciting sound, with huge bass-drum whacks and tam-tams that literally pulsate and explode with acoustic energy. Strings are generally smooth, as are woodwinds, and the weight of the brass is awesome. Dynamics are huge and uncompressed. To savor the full impact of this recording, only the most powerful audio systems will suffice.

Slatkin continues to add luster to his reputation, and this splendid performance is a case in point. He has a particular affinity for the music of Prokofiev, and this is exciting music-making. The St. Louis Symphony Orchestra is playing extremely well, a legacy from their training under my dear friend, the late Walter Susskind, and their ongoing development with Slatkin is evident. Paul Goodman certainly deserves the plaudits that have been given to his splendid recording. *Bert Whyte*


Jay Hoggard

Historical Organ at the Waalse Kerk in Amsterdam. Jacques Van Oortmerssen, organ.
Denon 33C37-7376.

Denon has been recording many of the great historical organs in Europe. The latest in the series is this CD recording of the organ in the Waalse Kerk in Amsterdam.

Many of the old organs in Europe have had to be rebuilt or restored or revised. The organ in this recording was built in 1680, and had work done on various stops in 1734 and again in 1965. At the present time, it is in excellent condition.

The church has a reverberation period just slightly over three seconds, and the organ sound is extremely brilliant, with great projection, clarity and articulation. The reeds are lovely, and there is a beautiful flute stop that organist Jacques Van Oortmerssen frequently employs. The low wind pressure of most of these old organs restricted pedal stops to 16 feet (32 Hz), but on this instrument a modern electric blower gives them considerable weight and power down to that limit.

Oortmerssen is an exciting organist, with gobs of technique. The "G Major Prelude," the "E Minor Sonata," the "Prelude and Fugue in D Major," and the "Partita Diverse" are given performances of considerable majesty.

Denon has made some very successful recordings of these great old organs and deserves credit for the superb digital sound. *Bert Whyte*

Debussy: Suite Bergamasque, Pour le Piano, Estampes, Images. Zoltán Kocsis, piano.
Philips 412 118-2.

If you like the piano music of Debussy, this CD is a real treasure. Pianist Zoltán Kocsis has a prodigious technique, witness his fleet-fingered, bravura performance of the toccata from "Pour le Piano" and the "Jardins Sous et Pluie" from "Estampes." He also knows how to be richly expressive and

The Compact Disc version of *On Green Dolphin Street* reveals a depth in the music of Archie Shepp that wasn't apparent on LP.

lyrical, as with his lovely playing of the famous "Clair de Lune" from the "Suite Bergamasque."

The piano has a high-definition, completely articulate sound, with ultra-fast transient attack. Even in the most rapid passages, there is never any blurring or smearing of detail, and the sound remains exceptionally clean and transparent. Although the instrument is miked rather closely, it is furnished with a warm, spacious ambience that affords a natural-sounding perspective. Dynamic range is quite wide, and there are massively sonorous chords which can be very demanding of amplifier power. As always, the magic quiet of CD provides an extra measure of realism.

Bert Whyte

On Green Dolphin Street: Archie Shepp
Denon 38C38-7262.

Sound: A– Performance: B+

This is one of Archie Shepp's revisionist recordings from the mid-'70s, in which he abandoned the *Sturm und Drang* of his acclaimed work in the '60s avant-garde and explored his bebop and blues roots. In the '60s and early '70s, Shepp was a screamer, burning his saxophone and blowing through changes with a passion that, no matter how far-out, was always informed by the blues. "In a Mellow Blues" finds him reinvestigating the roots of this form with rare nuance. Shepp slides into the slow dirge like smoke rising from the smoldering ashtray of his tenor. This CD immediately reveals that Shepp was never a smooth player. His tone scrapes and breathes with the years of experience he's spent paying his dues in the trenches of avant-garde music and black politics. Sam Jones' walking bass line is relentlessly urgent.

If it's possible, "I Thought About You" is even darker. It's a black ballad, with Shepp's laconically introspective solo draping itself around the slowly rolling rhythms of Jones, pianist Walter Bishop, Jr., and drummer Joe Chambers. Shepp turns this romantic ballad into a doomsday study of the interior.

But *On Green Dolphin Street* isn't all melancholy. It opens with a sprightly reading of the title track. Shepp rides

through the changes unbridled, his tenor weaving dips and spins around the rhythm. Tadd Dameron's "The Scene Is Clean" is given a lively run-through, with Shepp taking a lyrical tangent off Dameron's melody.

This is a straightforward CD recording, but it reveals a depth in Shepp's music that wasn't apparent in the LP version. Once one of the angry young lions, Shepp now reveals the creases and wrinkles which were always there, but which were smeared in his high-energy playing. I still wouldn't mind him stepping out on disc as he does live, but his non-nostalgic return to older forms is a joy nonetheless.

John Diliberto

Lars Erstrand and Four Brothers
Opus 3 8402 CD. (Available from Scandinavian Sounds, P.O. Box 12241, La Jolla, Cal. 92037.)

This is the kind of recording audiophiles love. Apparently Opus 3 set out to prove that Swedes can swing, and that the jazz idiom is not the exclusive province of Americans.

They recorded vibraphonist Lars Erstrand along with some good sidemen on tenor sax, piano, bass, and drums. The program opens with "Four Brothers" (made famous by the Woody Herman band), continues with a sultry version of "There with You," and then wends its way through such ballads as "Body and Soul," "Sunday," and several lesser known pieces. The arrangements are fairly straightforward, and the group plays them in a nice, easy, freewheeling style.

The sound is of demonstration quality, though this CD was made from an analog master recorded in 1984. Because it is of such recent vintage and probably was recorded at 30 ips, there is virtually no background noise. The recording was made quite close up, in a very dry acoustic space. This affords an intimate sound with great presence and projection. Stereo imaging is quite good, but there is very little depth.

With a vibraphonist heading the band, there is considerable emphasis on this instrument. The sharp, explosive transients of the vibraphone have to be heard to be believed. The tremendous peak energy of some of these high-frequency transients could

The remarkable clarity and detail present on these 20-year-old recordings by Manitas de Plata set them apart from others of similar vintage.

easily damage some tweeters, if playback level is set too high. The other instruments are equally well recorded.

Admittedly, there are no major jazz talents here. Nonetheless, this group demonstrates a good feeling for jazz, plays well, and has the advantage of exceptionally good recorded sound.

Bert Whyte

Manitas de Plata and Friends. Manitas de Plata in Concert. Manitas de Plata in Arles. Juerga!
Connoisseur Society CDs 4091, 4093, 4099, and 4126. (Available from In Sync Labs, 2211 Broadway, New York, N.Y. 10024).

Flamenco music evolved among the Gypsies as they travelled, assimilating styles from all the cultures with which they came into contact. Like American jazz, flamenco is highly emotional and improvisational.

The exoticisms become apparent as soon as you push your play button and begin to listen to any of these four CDs. Unfamiliar scales with unusual intervals and tunings, combined with strangely out-of-tune sounds, announce immediately that this is not "just" Spanish guitar music. The out-of-tune sounds turn out to be expressive microtonal embellishments similar to what we hear in Indian music. Melodic contours often suggest the North African influence the Moors brought to Spain.

Although these recordings were made over 20 years ago, they sound wonderful in their new CD versions. The recording team of E. Alan Silver and David B. Jones chose their equipment and techniques carefully, and they refrained from post-session sweetening such as compression and equalization. In those days before noise reduction, they used a modified Ampex 350 with half-inch tape running at 30 ips.

Silver describes the recording site as "a small medieval chapel adjoining the Julius Caesar Hotel" in Arles, France. Although he includes some room ambience in the sound, I would like to hear more of that room's character. On the other hand, close miking is part of the reason these recordings sound so good. They project the intimate, intensely emotional feeling of a live performance. But the remarkable clarity and detail are what set these discs apart from others of that vintage.

Transients have a crisp, sharply detailed quality. Often, Manitas de Plata uses his guitar as a percussion instrument, gently knocking the body to get a hollow, drum-like effect. On the strings, he creates a strikingly wide range of colors, which the CDs reproduce with beautiful clarity. Sometimes he plays with a richly resonant tone full of lower partials; at other times his tone is equally rich but sweeter, emphasizing upper partials. Elsewhere he uses damped strings to produce spiky percussive sounds that are full of inharmonic partials.

A good example of de Plata's skill is "Tarantas" on the *In Arles* disc. Listen to his control on those rapid runs and arpeggios and you'll know why his name means "Silver Fingers" in Spanish. The haunting harmonic colorations of the opening resonate with burning emotion. The "Gypsy Taranto" from the *In Concert* album has a distinctly Indian flavor, especially in Jose Reyes' microtonal vocal slides. Later, in the "Poetic Fandangos," de Plata displays some intriguing rhythmic effects—sudden, brief interruptions in foreign tempos, and asymmetrical groupings of beats.

Juerga! is an album of outtakes which Silver and Brown were alert enough to record. Between the "real" takes, de Plata and the Gypsies of St. Marie by the Sea improvised informally, just for fun. So the most exciting, flamboyant performances are on this album. Manero Ballardo's solo vocal improvisation, "Saeta," at the end of *Juerga!*, demonstrates with great clarity the main outlines of a flamenco melody and how it can be ornamented and extended. His performance is filled with heart-on-the-sleeve emotion.

Steve Birchall

Organ Music of Bach, Messiaen, Dupré, Widor and Franck. Michael Murray, organ.
Telarc CD-80097.

This outstanding recording was made on the new Ruffatti organ in San Francisco's new Davies Symphony Hall. With over 7,300 pipes and 132 ranks, this instrument is said to be the largest concert-hall organ in the United States.

Although the designers of the hall had all the resources of modern acoustic science at their disposal, the general opinion seems to be that the acoustics of this hall make it more successful as a recording venue than as a concert hall. I have yet to attend a live concert in Davies Symphony Hall, but on the basis of the two Telarc recordings made there thus far, the hall would seem to have most of the desirable acoustical characteristics for successful recording. Telarc's first recording in this hall, the Jongen "Symphonie Concertante" for organ and orchestra (reviewed in *Audio*, June 1985), certainly was a convincing demonstration that it is indeed a superior recording locale.

On this CD, we hear a solo organ recital by Michael Murray. Most great organs are installed in large acoustic spaces having reverberation periods of 3 to 6 seconds, but in a concert hall organists must contend with shorter reverberation times. In the case of Davies Symphony Hall, this is just slightly

over 2 seconds. An advantage of this situation is that the organ sound is very articulate, highly detailed and delineated. (This is in marked contrast to many organ recordings, in which the sound is rather murky and amorphous due to a high level of reverberation.) Still, there is sufficient reverberation to give the organ sound its traditional, full-bodied sonority.

Murray begins his recital with some nicely structured but not overly inspired performances of some of J. S. Bach's chorale preludes. He follows these with rather freewheeling and exuberant performances of some of the flashier showpieces of the French organ literature.

Murray displays his redoubtable technique in a dazzling performance of Olivier Messiaen's "Dieu Parmi Nous." Messiaen, a fairly prolific composer of organ music, quite often tries to imbue his works with a sort of otherworldly, rather mystical quality. The work recorded here shows a very different type of scoring, as it has violent dynamic contrasts. It opens with huge fortissimo fanfares from the full organ, followed by some quiet, introspective passages, only to have more high-level fanfares burst forth again. The finale features a crescendo of massive chords of ever-increasing intensity, culminating in a sustained passage of thunderous power.

Murray next offers a good performance of the well-known Dupré piece, "Prelude and Fugue in G Minor." He is particularly effective and exciting in the dance-like rhythms of the "Fugue." Then follows the majestic adagio from Widor's "Symphony No. 6."

The last piece on this disc is a triumphant tour de force for both engineer and performer. The César Franck "Final in B Flat, Op. 21" is a veritable orgy of great, exciting organ sound. There are monumental sonorities from huge pedal notes probing the subterranean limits of this great organ. There are massive chords and blazing fanfares. In the tumultuous finale, there is a concatenation of sounds from the full organ, ending in an ad libitum fortissimo of awesome power. I hardly need to add that this music dictates caution in setting playback levels. For organ aficionados, this CD is a must!

Bert Whyte

The Silver Collection: Oscar Peterson
Verve 823 447-2.

Nostalgia pervades this disc. Like a time capsule, the reissue provides a clear view of jazz styles from the late '50s and early '60s, and it also sheds light on audio production styles in the transition period between mono and stereo. This was a time when audio purists said that stereo was too gimmicky, complaining of ping-pong effects and a mysterious hole in the middle. Many added center-channel speakers to fill in that awful gap.

At the recording studios, the sophisticated solution to these problems was to record in three tracks, on ¾-inch tape. That gave the producer control over the amount of center-channel blending. The telltale fingerprints of that production style are all over these recordings.

On nine of this disc's 13 selections, the Oscar Peterson Trio plays with the Nelson Riddle Orchestra. Logically, Jim Davis put the entire trio in the center channel, and split the orchestra between the left and right channels. That guaranteed him a solid center image for the soloists, and a nice stereo spread, when played back on the hi-fi equipment of the time.

But what really counts is the music. Nostalgic sounds fill Nelson Riddle's arrangement of Gordon Jenkins' "Goodbye." The Dorsey-tinged trombone solo has a rather languorous feeling. After a climax with contrasting choirs (saxes, brass, Ellington-style high trumpets), the entire trombone section enters softly, imitating the Dorsey style further with a sweet, singing vibrato and a liquid legato. Riddle uses a reedy solo sax under the trombones to emphasize their smoothness. Through it all, Peterson improvises around the melody with an unhurried, lacy delicateness.

Riddle's arrangement of "My Ship" (by Kurt Weill and Ira Gershwin) opens with beautiful flute, horn, and harp sounds, and then blossoms into an expansive statement of the melody by the trombones. When the trio gets its chance to play the melody, Peterson makes only slight changes (mostly in style and rhythm). After an orchestral interlude using the introductory ideas, the trio returns, still making only slight changes to Weill's fine-spun melody. Finally, on the third entrance, Peterson begins to stray much farther from the melody. Soon the cellos enter with the main melody, and Peterson decorates that rich string color with a light filigree of improvisation.

The last four tracks were recorded even earlier than the Nelson Riddle cuts; they were produced by Norman Granz in 1959. Again, they seem to be three-track stereo, not stereo synthesized from mono originals. Musically, they are more adventurous because the trio is performing alone and can improvise more freely than they could with the orchestra.

Ray Brown starts Dizzy Gillespie's "Con Alma" with imaginative, rapid bass work. Contrasts of dynamics, tempos, and timbres underline the

Oscar Peterson's reissue sheds light on production styles used during the transition from mono to stereo in the late '50s and early '60s.

Sonic contrasts between Dollar Brand's low-note stabs and high-register runs are emphasized by a dry recording to which little reverb was added.

generally laid-back style and delicate textures. Peterson really swings in the middle but never lets it get out of bounds.

The reissue is great for Oscar Peterson fans. But where are the jacket notes for those encountering his style for the first time? Jim Fishel and Ed Levine restored these wonderful old recordings with care, and the CD brings out their best qualities. Despite the dated sonics, the music shines through, making the entire disc a delightful experience.

I offer one word of caution: On my copy, track 12 would not play on any of three players. I don't know if this defect is common to all copies or unique to the one I have, for Verve did not send a replacement copy before my deadline.

Steve Birchall

Anthem for the New Nations: Dollar Brand
Denon 38C38-7261.

Sound: A– Performance: B+

Dollar Brand, who also goes by the Muslim name Abdullah Ibrahim, is often described as an economical piano player. It's an expression that's meant to be praiseworthy, but I've always thought of it as a consumerist way of describing things. A Volkswagen is economical, generic detergent is economical, but not art and music. Instead, I'd say that Dollar Brand is discreet and tasteful, playing every note for its full meaning, with no loose ends or distracting bells and whistles.

Anthem for the New Nations is a solo piano outing digitally recorded back in 1978. These meditations offer the full spiritual range of Brand's music. "Biral" is a ritual dirge with a spacious, four-note ostinato played against a solemn blues refrain. "Liberation Dance" is one of those rousing, gospel-tinged anthems that Brand has mastered. This Compact Disc makes those charged, bass-note runs resonate with deft assurance.

This is a dry recording, with little if any post-production reverb added. So Brand's piano has a sometimes harsh presence as the recording plays fully on contrasts between his sparse, low-register stabs and rippling, high-register runs. This works well for the angular, jagged lines of "The Trial," reflecting Brand's misgivings about his homeland, South Africa. "Capetown" is rimmed with feelings of melancholy and wistfulness.

Much of Brand's solo music occurs in the spaces between notes, which are ample and, on this CD, truly silent. His austere style can become wearing, however, with pieces like "The Wedding Suite" bordering on Spartan self-denial. But the immediacy of Brand's emotions and the lack of florid sentiment that mars so many new solo piano recordings makes this a cleansing listening experience. *John Diliberto*

J. P. Sweelinck: Organ Works. Jacques Van Oortmerssen, organ.
Denon 38C37-7024.

J. P. Sweelinck had been dead for 64 years when J. S. Bach was born. He was never even close to being the musical giant that was J. S. Bach. Nonetheless, he wrote some original and interesting works for organ, including such things as toccatas, fantasias and preludes.

On this CD, organist Jacques Van Oortmerssen plays the ancient organ of St. John's Church in Schiedam, Holland. This organ is not a large instrument, and it has the typical reedy sound of the Baroque period. As with most of the low-power wind-chest instruments, the pedal is not very substantial, in this case a 16-foot Bourdon and a 16-foot Bazuin. However, the organ has a very clean and brilliant sound, with good projection in the highly reverberant acoustics of the church.

The Denon engineers have done an excellent job of recording this interesting old organ, and the eight selections here provide a good representation of Sweelinck's music. For organ buffs, especially those who collect the sounds of old and historical ones, this CD will be warmly welcomed. *Bert Whyte*

Richard Strauss: A Hero's Life. The Dresden State Orchestra, Herbert Blomstedt.
Denon 33C37-7561.

Strauss' autobiographical tone poem, "A Hero's Life (Ein Heldenleben)," romps hilariously through his musical world. He pokes fun at his critics and music in general with subtle good humor. But many listeners, distracted by the late 19th-century, larger-than-life style, may overlook the humor.

Strauss' gigantic sonata/allegro form is so large a forest that it disappears; all we see are the trees. He compounds that joke in many ways. At the end of the first theme's exposition, he throws the gauntlet down to his critics with a loud, pompously pyramided dominant seventh chord. But he leaves it hanging, unresolved, until after a brief silence, when the critics answer with the chattering chaos of the second theme.

In the expanded coda, a poke at the "Eroica" symphony, Strauss quotes from his own works, including, with sly humor, "Don Juan." Later, in track 6, the critics' voices once again rise, and Strauss quotes the "Jousting with Windmills" passage from "Don Quixote." Wryly, he tosses in some "bleating sheep" (muted trumpets) and an imitation of the wind machine (cymbal roll) as well.

In 1944, Strauss recorded "A Hero's Life" with the Vienna Philharmonic (now available on the Vanguard LP set SRV 325/29). His tempos were a bit brisker than what we are used to hearing now, and he tended to separate phrases rather than to connect them smoothly. Perhaps the most interesting difference is the way he treated his melodies. Instead of long lines with convoluted contours, his melodies often turned out to be rather simple, with added ornamentation—more like Mozart, in a certain sense. Clearly Strauss wanted that quasi-Classical approach to the piece. Blomstedt and the Dresden State Orchestra come fairly close to realizing Strauss' point of view.

Although I like Denon's use of track designations to mark the various sections, the booklet notes are confusing, and wrong on what takes place in tracks 4 and 5. The location of the recapitulation is unmistakable; Strauss wrote it in large, bold brush strokes. The booklet says it starts at the beginning of track 5, but on the disc it actually occurs at 6:04 in track 4, and track 5 starts at an irrelevant point later on.

This disc's most immediately attractive characteristic is the resplendently reverberant hall sound. Not only is it a properly big, spacious sound, but the

Riccardo Chailly and the Cleveland Orchestra offer a blockbuster CD which, musically and sonically, must be considered one of the best available.

quality and character of that sound are excellent. At times, in the loudest passages, I would like to hear more of the inner voices. The offstage trumpets in track 4 sound distant but not muffled.

The Dresden brass play with awesome strength and power, especially in the "Battle Scene." In quiet passages, the horns have a wonderfully dark tone and a flowing legato. You'll hear some unusual colors in the woodwinds, particularly the double reeds. Peter Mirring's solo violin tone is extremely bright, enabling him to stand out from the darker massed strings while still playing softly.

Blomstedt leads the Dresden Orchestra in an exciting, well-controlled performance. From the fury of the "Battle Scene" to the tenderness of the "Hero's Helpmate" to the quiet contentment of the closing passages, this is an outstanding recording.

Steve Birchall

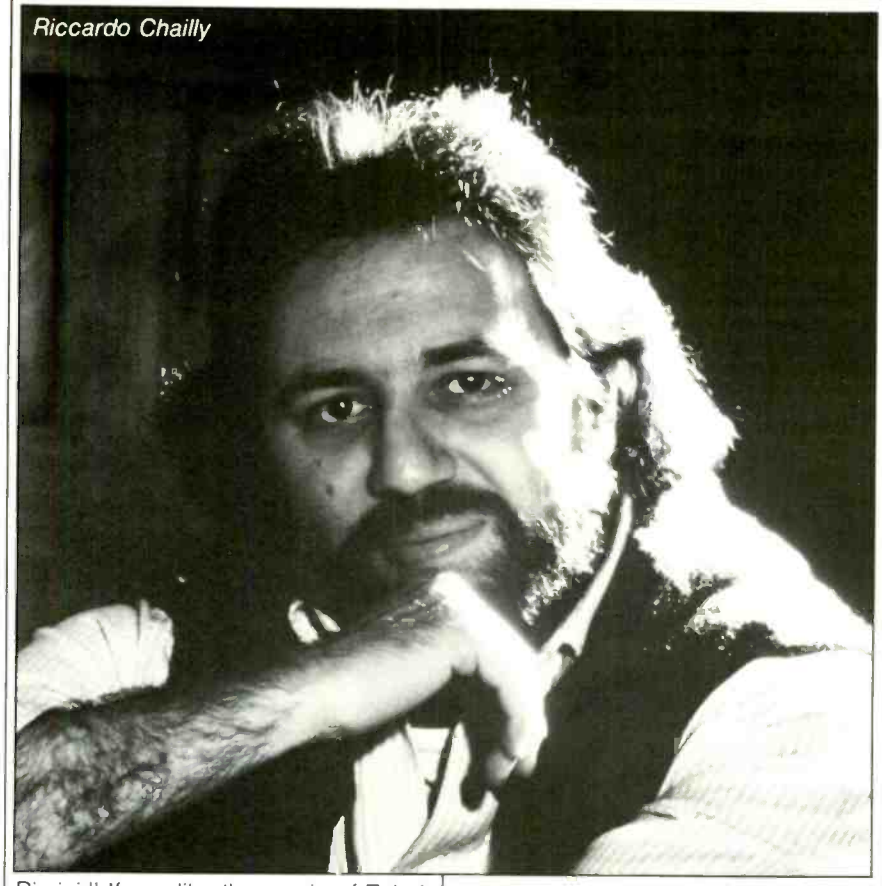
Tchaikovsky: Romeo and Juliet, Francesca da Rimini. The Cleveland Orchestra, Riccardo Chailly.
London 414 159-2.

Here is a blockbuster CD that will challenge the capabilities of even the biggest, most elaborate and expensive of audio component systems. Engineer Colin Moorfoot has provided a recording of enormous dynamic expression, without sacrificing clarity or upsetting orchestral balances.

The "Romeo and Juliet" on this CD is of more than usual interest, because the same music, with the same Cleveland Orchestra in the same Masonic Auditorium, was also recorded by Telarc. Both are fine recordings with surprisingly small differences. Here, the engineers opted for a slightly more distant acoustic perspective, so there is a bit more air around the instruments in this recording. In the opening passages of the work, the contrabassi in this version are somewhat darker and have more weight, and the bass drum is of lower pitch and has even more impact than the famous Telarc drum! The performances, though, are fairly similar, with Maazel on Telarc taking the piece at slightly faster tempi than Chailly.

However, the gem is Tchaikovsky's infrequently performed "Francesca da Rimini." If you like the music of Tchaikovsky but are not familiar with this particular work, you'll probably find it overwhelming!

Riccardo Chailly



For "Francesca da Rimini," Tchaikovsky wrote some of his most flamboyant music. In its unabashedly heart-on-sleeve romanticism, it becomes a searing emotional experience. Tchaikovsky's depiction of hell is a marvel of orchestration, with heavy use of brass and percussion. The love theme that follows is one of the most exquisite melodies Tchaikovsky ever composed. The finale is simply shattering, with huge brass fanfares and a barrage of bass drums, accented by explosive tympani strokes and the crash of cymbals and tam-tam. The final moments are cataclysmic, with the entire orchestra playing furioso and triple fortissimo.

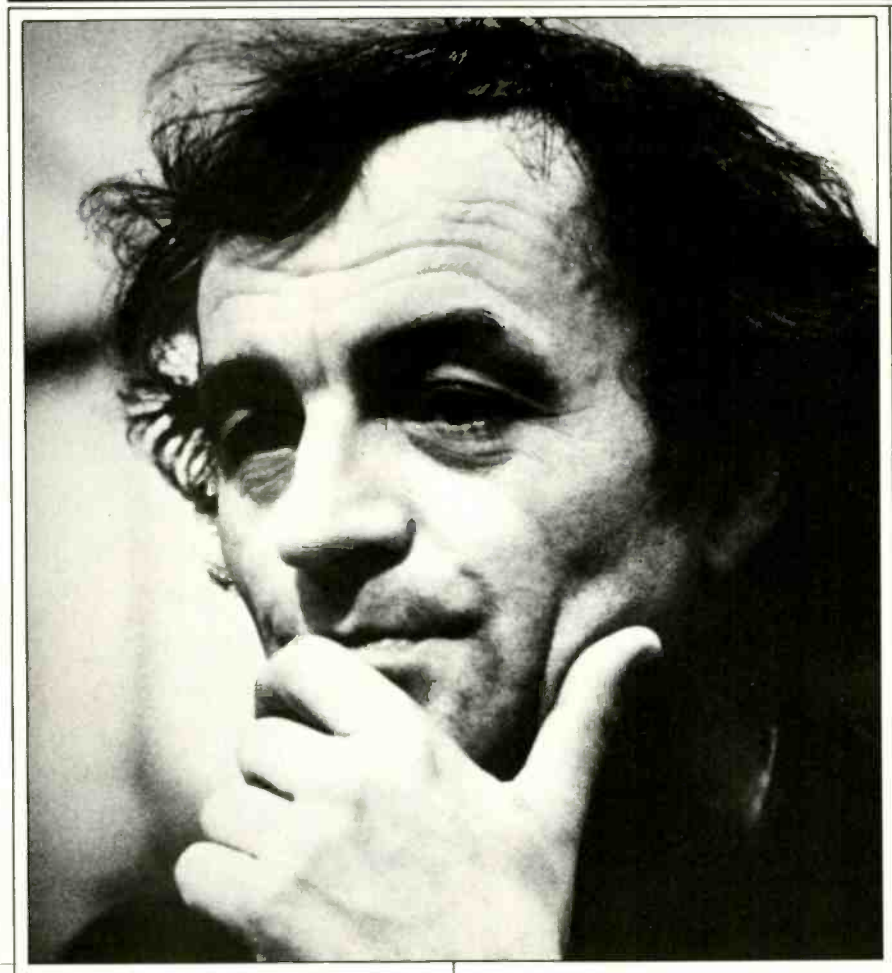
The Cleveland Orchestra plays all these fireworks with their usual precision and élan. Musically and sonically, this is one of the best and most exciting CDs currently available. *Bert Whyte*

Stravinsky: Le Sacre du Printemps, The Symphonies of Wind Instruments. L'Orchestre Symphonique de Montreal, Charles Dutoit.
London 414 202-2.

Stravinsky's "Le Sacre du Printemps" (The Rite of Spring) has always been a favorite vehicle for showing off the engineering skills of various record companies. Even this early on in the existence of the CD medium, there are six recordings of this ultradynamic score, and now we have a splendid new version from London/Decca. London is, in fact, competing with itself, for they have already issued an excellent CD recording of "Le Sacre" by Antal Doráti and the Detroit Symphony Orchestra.

No doubt they felt compelled to record this version because of the huge success of virtually every recording they have made of conductor Charles Dutoit and his Montreal Symphony Orchestra in the renowned acoustics of St. Eustache Church. As I have noted

Charles Dutoit's version of "Le Sacre du Printemps" delineates every strand of Stravinsky's complex and dynamic orchestration.



before, Decca engineer John Dunkerley has created an optimum recording setup to take advantage of the wonderfully warm, spacious acoustics afforded by the wood and stone interior of Montreal's St. Eustache. Achieving a well-balanced recording of "Le Sacre," which calls for a very large orchestra and a heavily augmented percussion battery, is no small feat. I well remember the problems I encountered when I recorded this piece with Sir Eugene Goossens and the London Symphony Orchestra. (Incidentally, Sir Eugene conducted the first performance of "Le Sacre" in England in 1913, just after its infamous premiere in Paris, which almost caused a riot! Sir Eugene told me that the British premiere concert was delayed for half an hour while they awaited the arrival of Stravinsky.)

Sonically, John Dunkerley has provided a recording that manages to cleanly delineate every strand of Stravinsky's incredibly complex and dynamic orchestration, while maintaining a most natural musical perspective. The scoring for percussion is a very vital element in "Le Sacre," and the various sounds of tympani, bass drums, snare drums, assorted bells, gongs, tam-tams, and cymbals are reproduced here with shattering and explosive impact. There are great brazen sounds from the brass, imperious in their projection. Woodwinds, including Stravinsky's beloved bassoons and bass clarinet, are well focused. Strings are clean and smooth, with especially sonorous contrabassi.

Dutoit performs "Le Sacre" more in a balletic fashion than as a concert piece, which certainly is a valid approach, since it is indeed a ballet score. Thus, he gives weight to the sensuous as well as the savage elements in it. Nonetheless, this is still a most propulsive reading in which the frenzied rhythms of the final dance, accented by pounding drums and blaring brass, reach a fortissimo climax of orgiastic power.

A stunning achievement. *Bert Whyte*

Stravinsky: Symphony in C, Symphony in Three Movements. L'Orchestre de la Suisse Romande, Charles Dutoit.
London 414 272-2.

The "Symphony in Three Movements" represents Stravinsky's fascination with rational, deductive thought processes. He breaks his ideas down into small modules and then assembles them in ever-changing ways to form a larger structure. Even his title calls attention to this prefabricated way of building a symphony. However, the real beauty of the piece is its transparent structure. All the sound blocks are clearly identifiable, and you can follow the unfolding of the form easily.

Despite its cerebral structure, the symphony is exciting, exuberant, and danceable. Propelled by powerful rhythms and sharp contrasts, with some deliberate references to the Big Bands of the '40s, it reflects the influence of American life and culture.

Stravinsky assembles the music from dozens of discrete sections with the skill of a Hollywood film editor, and the similarity is not accidental. The second movement started out as a film score, and newsreel images of World War II influenced the last movement.

Frequently he begins a module (such as the first movement's main theme) with an ostinato (a short, repeating loop of a rhythmic-melodic figure). Then he adds others one at a time until he has built a complex texture to accompany a brief melodic idea. Finally, he takes them away one at a time until you hear just the initial ostinato. Listening to that musical structure resembles walking up and down the sides of a stepped pyramid.

Like Picasso's cubist paintings, the musical ideas appear in different lights and from different perspectives. The flute melody at the beginning of the second movement starts over many times, but always dissolves into another idea before it's finished, very much like Picasso's superimposed layers of cones, spheres and cubes.

Though far from perfect, this shimmering CD of *Swept Away* bears the glow that Diana Ross brings to most of her projects.

Transitions take on their own significance, because Stravinsky uses the same transition modules in all three movements, including the important link between the second and third. The lighting and color change with every use. In the slow movement, the transitions before and after the middle section are the same music, but scored for strings first and winds second.

Stravinsky himself recorded the "Symphony in Three Movements" in 1962 for Columbia. As a conductor, he always had a rather jaunty, angular style. Dutoit comes surprisingly close to Stravinsky's reading, but within his own personal style. He retains all the best qualities of the composer's performance (the dry, spare, staccato style; the transparency of texture, and the aggressive forward drive), but contributes his own incisive sense of line, phrasing and punctuation. The Suisse Romande Orchestra plays both symphonies with refined tone colors, and the solo work is outstanding.

In 1961, London/Decca recorded Ernest Ansermet and L'Orchestre de la Suisse Romande in Victoria Hall, Geneva, in Falla's "Three-Cornered Hat." This time around, in the same venue, Decca enjoyed the technical advantages embodied in their proprietary digital recorder. The 1961 Ansermet recording was amazingly good, but the benefits of digital recording cannot be denied: The sound on this CD is so much cleaner. Bass response is more extended and has more weight and impact; the smoother midrange and high frequencies afford better definition on strings, a more realistic woodwind sound, more brilliance to the brass. Above all other improvements is the CD's ability to provide great dynamic contrasts in the dead silence of the digital recording medium. There are some orchestral tuttis of massive sonority on this CD.

The open sonic quality is also breathtaking. Instruments seem to be where they should be on the stage. (For instance, the bass clarinet at the end of the first movement clearly comes from the rear, while the strings are upstage.) Producer Paul Myers balanced the reflected and direct sound to give a sense of being in a real acoustic space without obscuring the orchestral details.

Occasionally, Stravinsky deliberately plays with hall acoustics. Early in the "Symphony in Three Movements" the two short, repeated notes in the upper strings and piano against the jazzy pizzicato in the cellos and basses depend on good hall reverb. This recording captures that effect beautifully.

In the third-movement fugue, subtle distinctions among the timbres of the trombone, piano, and harp often are hard to hear on LP, but are crystal-clear on this CD. On LP, the layers of intricate rhythms can be muddy, but this CD provides sharp definition and detail.

Another example of Stravinsky's neo-classical style, the "Symphony in C," is quite different in concept and structure. This Art Deco symphony, with its cool pastel colors, is a streamlined modern paraphrase of Mozart and Haydn. It too enjoys an insightful performance by Dutoit and the Swiss. Together, these two symphonies epitomize 20th-century neo-classicism. Listening to them via this recording is a joy. *Bert Whyte & Steve Birchall*

Richard Strauss: Le Bourgeois Gentilhomme Suite; Dag Wiren: Serenade for String Orchestra. The National Arts Centre Orchestra of Canada, Eduardo Mata.
RCA RCD1-5362.

I have always been fond of the music of Richard Strauss, and have had the pleasure of recording "Don Juan," "Till Eulenspiegel," and "Salome's Dance" with Leopold Stokowski, and his monumental "Ein Heldenleben" with Leopold Ludwig and the London Symphony Orchestra. I also count myself as an admirer of "Der Rosenkavalier" and other great works of Richard Strauss. However, try as I might, I just have never been able to summon much enthusiasm for his suite from "Le Bourgeois Gentilhomme" or for his "Symphonia Domestica." In a word, I find them dull.

They have their devotees, of course, and if you like "Le Bourgeois Gentilhomme," this new CD recording of it is to be recommended as very well done. Eduardo Mata, usually at the helm of the Dallas Symphony Orchestra, conducts the National Arts Centre Orchestra of Canada in a very polished, cohesive performance. Considering that he was obviously a guest conductor, Mata gets exceptionally fine playing from the musicians, especially from the high strings.

The good string work is also much in evidence in Dag Wiren's delightful 1937 "Serenade for String Orchestra."

Recorded in the warm acoustics of the National Arts Centre hall in Ottawa, the sound is very clean, the strings are quite smooth, and there is good detail on all other orchestral elements.

Bert Whyte

Swept Away: Diana Ross
RCA PCD1-5009.

Diana Ross glitters in her sleep. It's true. My friend Eddie swears she does, and he should know; he's her Number One Fan, and he knows *everything* about her.

I don't know about Ms. Ross' sleeping habits, but I *do* know that this shimmering CD version of *Swept Away* bears the special glow that the sophisticated singer brings to most projects in her ken. Ross has assembled the glitterati of the pop music world to assist her in the production, performance, and writing of this 10-cut disc. Lionel Richie, Daryl Hall, Jeff Beck, Julio Iglesias, Nile Rodgers, Arthur Baker, Karla De Vito, Robby Benson (yes, *the* Robby Benson), Richard Perry and Bob Dylan are just a few of the artists who have contributed to *Swept Away*. Although the disc is far from perfect (weak cuts like Ross' lethargic version of the rousing oldie "Rescue Me" sit like lumps of coal among the diamonds), when the material suits the singer, the glow can be seen from Kansas to Georgia—Georgia in the U.S.S.R., that is.

Such is the case with the opening selection, "Missing You." This is Lionel Richie's touching remembrance of the late Marvin Gaye, written especially for Ross, Gaye's longtime friend and short-time collaborator. The sense of yearning, of loss and sorrow, is achingly apparent in the singer's voice, which weaves through the deceptively simple melody with grace and restraint.

The digital version of the original 1984 recording is breathtakingly clear. On the above cut it captures with stunning clarity the sweet chiming of the

On the Wes Montgomery disc, you'll hear changes in acoustic perspective from track to track, but there's also a unifying stylistic coherence.

opening electric piano notes, the breathy, sad intimacy of Ross' voice, the almost subliminal accents of cymbal and maracas. The production work on "Missing You," by Richie and James Anthony Carmichael, is exquisite. Bernard Edwards, half of the famous Chic production duo (the other half, Nile Rodgers, is represented on this disc as well), has lent his talents to "Telephone," a spiffy cut with some superb special effects, like the magnified sound of a rotary telephone being dialed as though it were right next to your earbone. Daryl Hall and Arthur Baker polish up the title song with some hot percussion, channel shifting, and vocal echoes. Here, Jeff Beck's searing guitar burns a smoky hole right through the middle of the cut. Richard Perry and Raymond Arcusa pile on banks of strings and great swelling heaps of vocal choruses to highlight Julio Iglesias and Ross in their debut duet, "All of You." Ross' golden voice appears in the thick instrumental support ike a river of hot honey, Julio's like a stream of warm milk. Together they make a nice blend in a song which, despite all the *Sturm und Drang* of the arrangement, comes off as rather lusterless.

Ross produced the rest of the disc, and proves herself no slouch in this department. Best of all, she's willing to take some risks. The quirky "Nobody Makes Me Crazy Like You Do" is a truly freaky little number, one I would not have expected the ultra-smooth Ross to have attempted. "Touch by Touch" has some unique percussion work, with a slight Caribbean cast and a definite flair for the unusual synthesizer accent.

Again, this Compact Disc is technically superb. Clarity is outstanding. There's a real sense of instrumental presence, and left-to-right and front-to-back shifts give a firm sense of depth and breadth. The extended dynamic range shows off the big orchestral guns brought out for the Iglesias/Ross extravaganza and captures the songstress' softest whisper with ease. A jewel-box setting for the glittering Diana Ross, night or day. *Paulette Weiss*

The Silver Collection: Wes Montgomery
Verve 823 448-2.

This volume from Verve's Silver Collection presents an excellent survey of Wes Montgomery's distinctive, easy-going guitar style. The collection includes some live tracks and some studio tracks mostly with a small group, though a few were done with larger big band and string ensembles. All were recorded in 1965 and 1966.

My favorite track is Erroll Garner's irresistible "Misty," arranged for big band by Claus Ogerman. Montgomery goes fairly far afield, but always retains a sense of identity with the original. Partway into the track, the tempo picks up and Montgomery takes the beginning fragment of the melody through some fascinating transformations. The rhythms acquire a shuffling, swing-like character as he departs from the main idea. Slyly, towards the end of the cut, he sneaks back to a comfortably recognizable recap.

Ogerman uses simple trombone and flute colorations and a sax countermelody to set off Montgomery's inventive improvisations. Regrettably, Ogerman's arrangement is not especially interesting.

Listen to Montgomery fly with John Coltrane's "Impressions." He takes a fragment at a time, spinning off endless variations before going on to the next. He uses Coltrane's approach but keeps his own style. However, I kept wondering where the bass was. It's essential, but almost inaudible.

Since these tracks were recorded in at least three different locations, you'll hear changes in acoustic perspective. All were produced by Creed Taylor and engineered by Rudy Van Gelder, so they have a stylistic coherence, and the differences slip past easily.

The first four tracks are live at the Half Note, with rather close miking and not much room ambience. Track 5, a studio track, is noticeably drier. The stereo perspective is typical of the period: Guitar and organ in the center, with the drums split left and right, and

Monk's Moods doesn't fall below what we expect from state-of-the-art technology, but it never approaches sonic or artistic heights.

no depth of field at all. Track 7 takes you back to the Half Note, and a bit of ambience and depth of field return.

In the big band material (tracks 8 and 9), the same approach to channel assignment is apparent. Montgomery and his group are in the center, with the band split left and right. This sounds logical and clean on the finished product, and at the time was the preferred way to record such an ensemble. Today, a minimal-mike producer would attempt to put the solo group at the front as well as in the center. The band would be spread out behind them, with no interruption in the middle.

The booklet documents the performers, dates, places, and technical staff. Anyone who knows Wes Montgomery's style will recognize the value—and the pleasure—this collection can provide. Unfortunately, the booklet doesn't help those who are not already acquainted with Wes Montgomery's music. Verve would do well to put some hook on the outside to intrigue browsers to buy the disc. On the inside, some background on Montgomery and his contributions to music might help. Although it's a minor point, most of the track timings given in the booklet are inaccurate, and should be corrected in a future printing.

Steve Birchall

Monk's Moods: The Great Jazz Trio
Denon 38C38-7323.

Sound: B+ Performance: B

How can you go wrong with a CD full of classic Thelonius Monk compositions? You can't, but while the Great Jazz Trio turns in a solid performance, they add little to the many classic recordings of these tunes. The Great Jazz Trio is essentially pianist Hank Jones and whoever he has in the rhythm section; on *Monk's Moods* it's the stalwart bass of Eddie Gomez and the lesser known drummer Jimmy Cobb.

Jones is a pianist in the Monk mold, sparse and methodical; there's never a stray note or errant burst of sentiment. He's been here before, and on this recording he sometimes sounds like it. He gives "Blue Monk" a hesitant, perfunctory reading, and "Ruby My Dear" is saved by a bending read of the melody from Gomez.

Trumpeter Terumasa Hino guests on " 'Round About Midnight" with a witty, acerbic run on Monk's classically melancholy tune. But the reverb on his trumpet is unnatural and distracting next to the dry recording that the trio receives. On "Jackie-ing" Jones uses a Yamaha DX-7 synthesizer to emulate the organ and xylophone of a circus band, but these synthesized sounds are buried in the mix of marching drum rolls and then abandoned once Jones takes off on his solo.

Jones does rise to the occasion for the rousing "Bemsha Swing," with Cobb's churning African polyrhythm underpinning the pianist's stabbing percolations on top. "Misterioso" lives up to its name with a wash of cymbals revealing the Möbius-strip melody played by Jones in split octaves. Hino returns for "I Mean You," firing up the group with a glistening, pointed solo and then trading fours all around in the most spontaneous moment on the entire disc.

Overall, however, *Monk's Moods* is flat. It exists at a level below which great artists and state-of-the-art technology rarely fall, but it never approaches the heights, either.

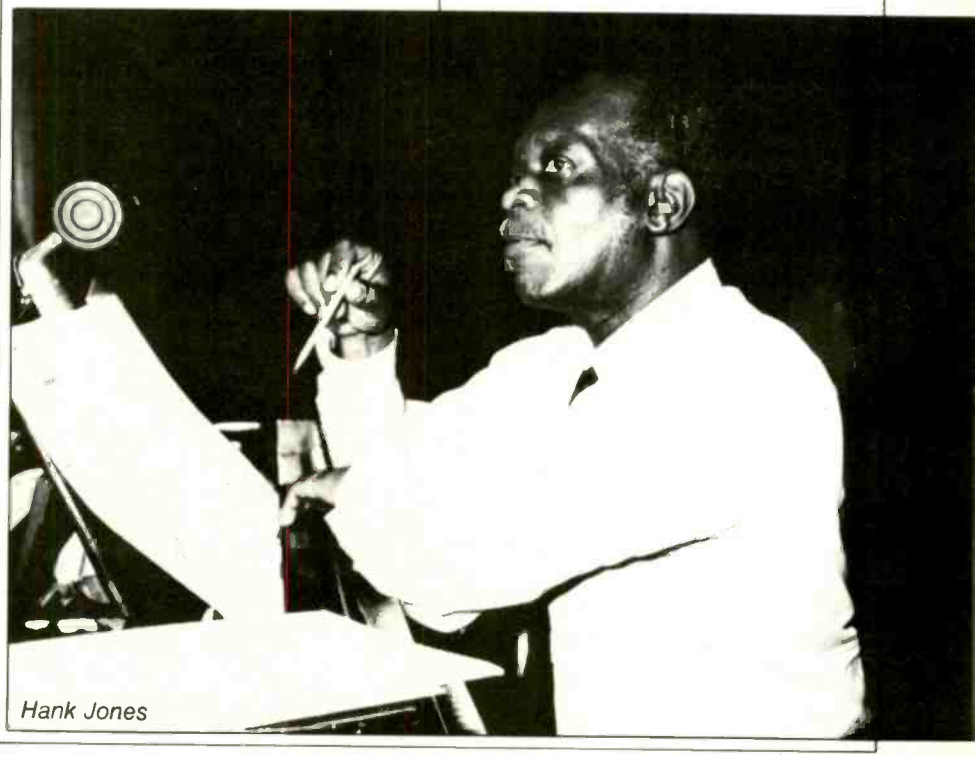
John Diliberto

The Blues . . . "A Real Summit Meeting": B. B. King, Muddy Waters, "Big Mama" Thornton, Eddie "Cleanhead" Vinson, Clarence "Gatemouth" Brown, Jay McShann, Lloyd Glenn, and Arthur "Big Boy" Crudup.
Mobile Fidelity MFCD 2-813, two-disc set.

Preserving the rich heritage of American jazz and blues is one of the most important functions of recording. This music is performance-oriented rather than notation-oriented; in a real sense, a sound recording *is* the notation for this music.

New generations of musicians learn about their past by listening to recordings. For instance, when The Rolling Stones first toured America, one of the most valuable souvenirs they took back was a collection of old blues recordings scrounged from used-record shops in various towns they visited. To them, this was primary source material—and inspiration.

A recording made in 1973 ought to sound reasonably good even by present standards, and this is an outstanding CD re-release. Looking at the credits, I began to assemble an aural im-



Hank Jones

A Real Summit Meeting **has just enough hall ambience to keep it from being too dry—a good choice, since the blues demands intimacy.**

age of what this recording might sound like. Since it was taped at Philharmonic Hall in Lincoln Center, I figured it should have noticeable hall ambience, and that it almost certainly was multi-miked. Record Plant's remote facilities would have had the best hardware available at the time, including either Dolby or dbx noise reduction, so I expected the sound would be clean. (Remembering the debates between devotees of each NR system in those days, I wonder if anyone can now tell, by ear, which was used.)

As I listened, I was surprised to find that producer Mark Abramson close-miked the performers so tightly that very little hall sound is present in the recording. The usual cure, within the multi-miking style, is to add mikes to capture the hall's reverb, and mix that in later, perhaps even adding some artificial reverb in the final mix-down back at the studio. (Don't forget that musicians often use the spring reverbs in their amplifiers to achieve desired tone colors.)

In this recording, we hear just enough ambience to keep it from being unpleasantly dry. This turns out to be a good choice; the blues demands a certain amount of intimacy because it expresses intensely personal feelings.

Stereo spread in multi-miked live recordings is likely to be similar to the actual stage arrangement, but idealized and improved. Depth of field usually is minimal. The producer can place the sounds anywhere he wants, from left to right. But a curious effect occurs on the second of these discs. In Lloyd Glenn's set, near the end of "After Hours," the piano sound suddenly contracts from stereo to mono. You can hear the expected loss of highs from phase cancellations when the two channels are paralleled. This continues until the middle of "Pinetop's Boogie Woogie," where the sound is suddenly stereo again. But just before the return to stereo, the piano suddenly moves a few degrees to the left.

Why all this happens is nearly impossible to guess with much accuracy because so many unknown variables were at work. One possibility is that a channel temporarily went dead or developed some noise, and thus was not usable in the final mix. My guess is that the producer chose to place the solo piano at the recording's center stage for "Pinetop's." He had to make the new channel assignments just before "After Hours" ended. This would explain the paralleled channels and the loss of highs and ambience. Through the speakers and phono cartridges of 1973, it probably gave the intended spotlighting effect. The preparations were probably not audible then; today, a producer would have to use more subtle methods.

A fascinating effect occurs in Clarence "Gatemouth" Brown's renditions of "The Drifter" and "Please Mr. Nixon." The sound is noticeably dry and intimate. But when he sings just loudly enough, the mike picks up a touch of reverb from the hall. He intentionally plays with the effect as he sings. That touch of ambience cosmically expands his outbursts of bluesy anguish. The lack of it in the quiet places makes the message almost unbearably personal, as if he were speaking directly to you, soul to soul.

The fact that we can hear all of this tells us that Mark Abramson did not gimmick up the reverb artificially, nor was Mobile Fidelity tempted to "improve" the sound. They all had the good taste to leave things alone.

Because noise reduction was used in the original recording, it is free from audible tape hiss (but not the masking effects of the remaining noise). In 1973, hearing subtleties such as wire brushes on a snare-drum head or a quiet cymbal roll was a big deal. Tape hiss usually partially obscured these sounds. The CDs' occasional extraneous noises are the hums and buzzes of the guitar and bass amplifiers, accurately reproduced.

Within the limits of 1973 technology, the original recording is remarkably clean and transparent. The spectral balance is good, too, although we might expect greater clarity in the extreme highs on a more recent recording. The mixes are especially well done, allowing all the musical textures to come through. The all-important walking bass is usually fat and round without being mushy. Its enveloping warmth always helps to relieve and comfort those suffering from the blues.

Dan Morgenstern's liner notes are excellent, but the way they are presented is ridiculous. On the first page, we get 10 lines of microscopic type in the upper right corner; the rest of the page is blank. The following three pages use the top third, leaving the rest blank. I can see no particular purpose in this. If Mobile Fidelity had used all these acres of available space for photos or additional text (such as the names of the backup musicians), they would have a case for tiny type, but scrunched up into the corner, it is silly. Why not make it readable?

Musically speaking, blues lovers will find much to like in this recording. My personal favorites are Muddy Waters' contributions. Something about his guitar sound sears your brain until you say, "Oh, yes, I know that feeling."

Jay McShann's violin solo, "Smooth Sailing," shows us a purer, more authentic style than we are used to hearing. His playing reveals much about how the blues influenced later performers such as Jean-Luc Ponty, Doug Kershaw, and "Papa" John Creech.

To hear the blues performed with such authenticity and by its best practitioners is a real treat. To have it refurbished and preserved with such care on CD is even nicer. *Steve Birchall*

B. B. King

A technically splendid recording that features magnificent definition of space complements the vocal capabilities of The Nylons.

One Size Fits All: The Nylons
Open Air Records OD-0301 DIDX 187.

Have you seen the Monty Python crunchy frog routine, the one in which a manufacturer of cream-filled chocolates reveals that one of his confectionary fillings consists of a tiny dead frog? Well, this little bonbon is the crunchy frog in the candy box of pop CDs. The Nylons' *One Size Fits All* is oddly intriguing, but I'm not quite sure I like it.

Here are 10 basically a cappella versions of classic oldies and original material. (Some percussion and synth "Electrobeat" lightly shore up the vocals, but that's it on instrumentation.) There's no question that the four Nylons can sing; they've got every inch of the '50s doo-wop terrain down, from their stratospherically high falsetto to their earth's-core basso profundo. But the quartet forays into an entirely different realm of '50s vocal style, with some saccharine harmonies reminiscent of The Four Freshmen and their alpaca-sweatered ilk.

When The Nylons apply this vocal meld to oldies like "Town Without Pity," "Silhouettes" and "Up the Ladder to the Roof," the results are mixed. "Silhouettes" survives nicely, perhaps because it is not massively tampered with and retains the integrity of the original. The teen weeper "Town Without Pity" gets a really silly intro and never pulls out of the initial shock. The original material is mostly unoriginal in lyric and melody, merely acting as a framework for some pretty spectacular vocal gymnastics.

Complementing the capabilities of these four vocalists is a technically splendid recording. Reverb was used liberally on the 1982 Attic original, which has been digitalized here for the new Open Air Records label. The sense of voices floating lightly in space or fading into infinite distance is truly delicious. Voices appear on multiple aural planes, sweeping in from the left and right, blooming from deep silence into the phantom center; the definition of space and presencing of individual vocals is magnificent.

Still, as I mentioned earlier, I'm not sure what to make of this odd little confection. Crunchy frog, anyone?

Paulette Weiss

Ravel: Le Tombeau de Couperin; Debussy: Danse Sacrée et Danse Profane; Fauré: Dolly Suite; Ibert: Divertissement. The Academy of St. Martin-in-the-Fields, Neville Marriner.
Vanguard CD 25019.

Neville Marriner and his Academy of St. Martin-in-the-Fields orchestra have established a great rapport in the many years they have worked together. They have made many recordings, mostly of what can be described as light classical music. Their performances are rarely less than good, quite often brilliant, and, on some works, near-definitive. Marriner and his orchestra have also fared very well in matters of sound, reaping the benefits of much fine engineering from Decca and Philips.

On this Vanguard CD of some well-known French confections, performances and sound quality are up to this group's usual standards. Ravel's popular "Le Tombeau de Couperin" and Debussy's "Danses Sacrée et Profane" receive carefully wrought, well-balanced performances, characterized by superb playing. The important harp in the Debussy work is beautifully recorded. The Fauré "Dolly Suite" is a tuneful trifle. The real treat is Ibert's wonderfully saucy, racy, irreverent "Divertissement." Marriner offers a brilliant reading, full of wit, with a nice handling of the satirical elements in the score. In "Cortege," the second section of the piece, he captures well Ibert's delicious burlesque of the "Wedding March." The closing "Parade" and "Finale" are rowdy and raucous, and the parody on "cancan" themes is played at a breathtaking tempo.

The sound is clean and well balanced, its high definition clothed in the warm ambience of EMI's Abbey Road Studio One.

Bert Whyte

We Are the World: USA for Africa and various artists.
Polygram 824 822-2.

We, the human beings who inhabit this planet, really *are* the world. In the Global Village we can't hide from humanity's problems—they are our *common* problems. That message rings loud and clear through this recording.

Writing a song appropriate for this cause is not an easy task. Should it be troubled and stormy? Anguished? Militant? Perhaps a rousing call to action? What Michael Jackson and Lionel Richie composed is an uplifting anthem, filled with the spirit of love and brotherhood. Even the shape of the song expresses the concept of joining together to relieve the suffering, starvation, and death in Africa.

Quietly, the instrumental introduction, with a subtle, trumpet-like fanfare on the synthesizer, leads into the first verse. One lone voice sings, "It's time to lend a hand to life, the greatest gift

The Wall communicates its nightmare world better on CD than on LP, because you can hear Pink Floyd's sonic images much more clearly.

of all." More and more voices enter, each in the performer's unique personal style, as the song gently gathers momentum. Finally, that chorus of superstars closes ranks, singing and clapping together in joyous friendship. Alone, you can't do much, but together "We can make a brighter day, so let's start giving." That chorus of soloists functions as an ensemble. Given their diverse personalities and musical styles, that's a neat trick, and producer Quincy Jones has brought it off with real flair.

At the beginning of the first chorus, listen for the sounds of an African finger piano, a hollow, wooden resonator with tuned bars plucked by the thumbs. For centuries, walking has been the dominant form of transportation in Africa, and while people walk from place to place, they play finger pianos. This characteristically African sound bubbles up through the mix frequently.

Two criticisms are in order. First, the mix has very little dynamic range. For almost the entire song, the level hovers between −3 and −10 dB on a VU meter, obscuring the overall effect of gradually gathering forces. Never do we hear the power and strength of a real crescendo. The chorus often seems weaker than the solo voices, because the mixers trimmed the level on the massed voices. Clearly, Quincy Jones and the mixers (Humberto Gatica, Larry Ferguson, and Khaliq Glover) wanted a mix suitable for radio play. But for the album, using an expanded dynamic range to reinforce the song's structure and emotional impact is not optional—it is something that should have been done.

The other problem is the spatial character of the mix. All the performers are nicely arrayed from left to right. But where's the depth? The song is full of glorious opportunities for solo voices to pop out spatially from the larger ensemble. I really want Ray Charles' embellishments to jump out front, instead of staying in the chorus. At the end, I want that entire chorus to move up to the front of the sound stage, overwhelming me with sound, but they seem reticent instead of enthusiastic, sonically glued in place.

Since the other tracks on the album were recorded in different studios, the disc presents a fascinating opportunity to hear a variety of pop production styles. Steve Perry's "If Only for the Moment, Girl" has a nice, relaxed feeling, with a sax solo that sounds properly distant. On this cut, a whistle and some percussion sounds always grab my attention.

Bruce Springsteen's live recording of "Trapped" uses dynamic contrast to punctuate the music. The slightly grimy sonic quality reflects the real-life feeling of Springsteen's industrial-strength rock. Twice in "Total Control," Tina Turner stops suddenly, and lets silence intervene before she continues. The strangely dry quality of the imaginary acoustics suits the song well; intense and tight, it's a short acoustical leash.

Enjoy the album, but remember its message: We have the power to solve humanity's problems, if we want to. Through helping our fellow passengers on Spaceship Earth, "We're changing our own lives." *Steve Birchall*

The Wall: Pink Floyd
CBS C2K 36183, two-disc set.

The Wall communicates its nightmarish world far better on CD than on LP, because you can hear much more clearly the sonic images Pink Floyd created. It's like watching *Star Wars* in 70mm after seeing it on a small TV screen.

The story is a somewhat autobiographical, Faustian journey through life. It takes you from birth, through the tangled success and disillusionment of middle age, to the eventual destruction of the shell we each construct around ourself. Pink Floyd's roots are in the 1960s' political activism, and they retain the belief that we can change the system for the better. Unlike many punk and New Wave performers, who merely seek refuge behind a defensive barrier, Pink Floyd offers a solution: Tear down the wall!

On the first disc, tracks 5 through 7 start with hard-rock sounds left over from track 4, but quickly mellow out a bit. In track 5, on the word "wall," the space suddenly becomes larger and more reverberant. A children's chorus enters, protesting the educational establishment's repression of curiosity and inquiry. A freely soaring, Santana-like guitar solo follows. The track ends with uncannily spacious playground and traffic sounds that seem more a part of your own environment than of a recording.

Track 6 is a quiet piece for acoustic guitar and voice—but not quite. The guitar sound is typical folk music, but the voice is larger than life, with overdubbed unisons and too much reverb to match the guitar. The "little man inside the mind" demands to be heard.

Track 7 emerges out of silence, with quiet bird chirps, an airplane and a child's innocent voice. A Simon and Garfunkel parody reminiscent of "Scarborough Fair" follows, but it seems too close, as if you were in the front row at the movies. A surprising transition takes you into track 8. Are you passing through a subway station or maybe an airline terminal? Who knows?

Like it or not, you are now in "Empty Spaces." Shortly, a transatlantic phone call sets the stage for checking into an expensive, but strange, hotel. Listen to the ambient changes as the girlfriend checks out the suite's bathroom.

During all of these happenings, the background is velvety silence. The transition between tracks 6 and 7 uses silence effectively to wind down the dramatic tension and balance the disturbing, terrifying episodes that are to follow on disc two.

The demented atmosphere of *Marat/Sade* pervades "The Trial." Woven into this climactic scene is a quotation from Elgar's "Pomp and Circumstance March No. 1" as the hapless defendant's grade-school teacher testifies against him. It's slight, but sinister, because expectations won't be fulfilled. The ugly transformations of "Another Brick in the Wall" presage its destruction. Finally, the nightmare ends with a

On Sade's *Diamond Life,* expansive reverb with a fast decay emphasizes the feeling of being trapped. Otherwise, effects are sparse and textures lean.

peaceful resolution: Rebuilding human relations, love, and understanding.

The Wall truly comes into its own on CD. The range of emotions and dramatic settings makes it an exciting work. Pink Floyd's imaginative use of the recording medium to depict all of this is idiomatic and imaginative. Their skillful use of analog technology at its peak makes me all the more eager to hear what they could do with the latest digital multi-track recorders and sub-coded graphics. *Steve Birchall*

Diamond Life: Sade
Portrait RK 39581.

Despite the exterior wall surrounding Sade's (Shar-day's) world of fettered feelings, this group's music has a passionately emotional interior. The rather prison-like atmosphere is a political statement meant to show that we all suffer from the same afflictions. Living in the shadow of The Bomb, and in the social traps of life, all of us tend to put up a hard exterior to protect the vulnerable, sensitive person inside.

That's what Sade does musically. On the outside, their music is glossy, commercial disco/jazz, seemingly without substance. But that bland coating has been applied with a skill that betrays the value and intensity of what's inside. If you don't know what to look for—if you don't acknowledge and share some of Sade's feelings—you'll miss the point.

In decorating the sparse acoustical set on his imaginary sound stage, producer Robin Millar restricted himself to a small group of sounds. The ambience feels very close, but contained within a large space. Millar gets this effect with expansive reverb, with an unnaturally fast decay to emphasize the feeling of being trapped. Concrete and steel seem to be the predominant surfaces of this unfriendly environment; boosting the highs on the reverb unit's output does that. Millar puts each instrument in separate cells, with plenty of space between them, to reinforce the isolation.

Musically, Sade keeps the textures lean. Short, sharp percussion prevents clutter in the accompaniments. Sade always restrains the range of a dynamic swell or a change of timbre, conserving resources in their bleak world.


Sade Adu

The sax solos that open two songs are similar, but different in important ways. In "Your Love Is King" Stuart Matthewman plays with a smooth sound, but he uses a rougher, slightly raunchy tone for "Frankie's First Affair." In the context of the style, that difference speaks volumes. Lead singer Sade Adu responds to the sax in "Frankie" with a breathy vocal.

Every song has a clear structure and a well-defined emotional and musical peak. The volume goes up, the texture becomes more complex, the performers become more openly expressive, and sounds not heard previously suddenly appear. Within the restricted dynamic range, Sade does not forget to use contrasts to highlight a climax. When it occurs in "Frankie," Andrew Hale adds an almost inaudible touch of string sounds on synthesizer.

An appropriately austere booklet complements the music with visual images and typefaces that prepare you for the musical experience. The four stark photo portraits of the musicians capture Sade's spirit effectively.

The question is whether Sade will break out of their self-imposed prison and show us the depth they really have. More of the same could degenerate into neurasthenia. What do they have to say when they drop the pseudo-shallow, punk/New Wave attitudes? If life is miserable, does Sade have any hope that society can change? *Steve Birchall*

Vivaldi: The Four Seasons. The Taverner Players, Andrew Parrott; John Holloway, violin.
Denon 38C37-7283.

Although the classical repertoire is expanding very rapidly on CD, in such a new format the music of many composers is not available at all, or has only token representation. Nor are we talking about esoteric, little-known music, but much that certainly is considered to be in the standard repertoire.

Of course, the record companies can hardly be blamed for trotting out all the famous "old warhorses" and assorted other chestnuts for the most basic of reasons—they are sure-fire sellers! Granting this, would you believe that this fine CD recording of Vivaldi's *The Four Seasons* is the 15th version to appear in the fledgling format?

My quibble about this is that 15 versions are a bit much for even the most dedicated devotee of CD and Vivaldi to sort through. Surely a half-dozen recordings by acknowledged masters of this music should be enough? Instead of more redundant versions, the concentration should have focused on the gaps in the classical repertoire.

Be that as it may, this CD joins the Hogwood/L'Oiseau-Lyre and Ozawa/Telarc recordings as one of the most musically and sonically satisfying versions of this ingratiating music. The Taverner Players are a group of exceptionally talented musicians who per-

Every subtle shading of tone, phrasing, and dynamics makes its point with exquisite perfection on John Lewis' disc of Bach preludes and fugues.

form on original instruments or copies of same. Andrew Parrott, their founder and conductor, has had the benefit of studying under such luminaries as Claudio Abbado, Sir Colin Davis and even Leopold Stokowski. In fact, in his finely wrought performance of this work, the very expressive string playing is reminiscent of Maestro Stokowski's renowned string sound.

The engineer who recorded this music is Britisher Tony Faulkner. Tony, one of the best classical recording engineers in the business, espouses the use of such "purist" mike techniques as Blumlein (coincident figure-of-eight) or M/S (figure-eight/cardioid "middle-side"), although he has recently been using a pair of the new Brüel & Kjaer omnidirectional condenser mikes. He achieves a lovely, clean sound, with precise localization and a lot of depth, all clothed in the warm ambience of Rosslyn Hill Chapel in London.

Considering the superb performance and the musical realism of the recording, I'd say this Denon CD is the recording of choice for Vivaldi's great "Four Seasons" score. *Bert Whyte*

J. S. Bach: Preludes and Fugues from the Well-Tempered Clavier, Book I. John Lewis, piano; Joel Lester, violin; Lois Martin, viola; Howard Collins, guitar; Marc Johnson, bass.
Philips 824 381-2.

Bach would enjoy John Lewis' performances of these pieces. Set aside all those stuffy period-instrument performances with their "historically correct" but unimaginative style: John Lewis plays Bach's music with loving admiration. But he also improvises around the existing musical structures, infusing them with just the right amount of 20th-century style and feeling.

Put your letter-writing pens down and relax. Yes, I do admire what Harnoncourt, Leonhardt, and Pinnock do with Baroque music and style. Nonetheless, Bach, more than anyone else, would feel cheated if a 20th-century musician didn't bring his own style and personality to a performance. The early-music specialists are trying to re-create how a performer in Bach's time might have played the music, but when they succeed it is because of their own personalities and vitality.

John Lewis succeeds because of his warmly humane musical personality, and because he interacts with Bach at the creative level. Lewis approaches Bach with quiet understatement, always gentle, always elegant, letting the jazz elements sneak in. A subtle change of rhythm in a repeated figure makes a reference to swing. A modulation to a distant key provides a blues feeling. An unexpected melodic turn evokes a well-known jazz tune. A Baroque ornament becomes a blues ornament with just one chromatic change. Using such simple musical gestures as these, John Lewis manages to say a great deal.

When he departs from Bach significantly, you are prepared for it. Lewis' improvisations have their own special beauty, and frequently have the sophisticated, wistful feeling of a Bergman or Fellini film (especially "Prelude No. 2" and "Fugue No. 7").

Listen to Lewis' careful and sensitive phrasing, articulation, and pedalling when he is within the Bach style. Few pianists, other than Glenn Gould, have played Bach with this degree of expressive control.

Although these are keyboard pieces, Lewis adds violin, viola, bass, and guitar in the fugues. Again Bach would appreciate the clear texture this very Baroque chamber ensemble brings to his music. Lewis, as arranger and coproducer, takes the extra step that Bach would have taken, too. He gives each melodic line in the recording the independence it needs in order for its logic to be followed, while allowing the strength of Bach's musical conception to hold all these elements together.

This CD was coproduced by Kiyoshi Koyama, with E. Alan Silver credited with "recording supervision." The sonic atmosphere feels comfortably intimate, and never does the hall's reverb intrude on the linear clarity of Bach's music. Marc Aubort and Tom Lazarus engineered the all-digital sessions, which took place in New York's Rutgers Church. Aubort's keen ear for open, relaxed sound lets the recorded music sound completely natural and real. Every subtle shading of tone color, phrasing, and dynamics makes its intended point with exquisite perfection. Played back on a good system, this CD easily creates the illusion of hearing the group live.

If Bach could hear these beautiful performances, he would probably want to sit in and jam with John Lewis, trading ideas and styles.

Steve Birchall

Haydn: Symphonies Nos. 94 and 100. The London Philharmonic Orchestra, Sir Georg Solti.
London 411 897-2.

The Haydn Symphony No. 94 ("The Surprise") and Symphony No. 100 ("Military") are given taut, spirited performances by Sir Georg Solti, who elicits some particularly good playing from the London Philharmonic Orchestra. The precision and élan of the string section is especially noteworthy.

London/Decca also recorded the Haydn "Military" symphony with Christopher Hogwood and the Academy of Ancient Music, reviewed in the May 1985 issue of *Audio*. In that review, I pointed out that various conductors, and the engineers of their recording companies, have taken widely different approaches to the famous "Allegretto" second movement with its bass drums, tympani, military snares and trumpet calls. The ancient Scherchen recording on Westminster Records became a famous hi-fi demo record because of the very bombastic treatment of the percussion. The Hogwood recording opted for a straightforward approach.

Interestingly, the Hogwood version and this one by Solti were both made in Kingsway Hall in London, long a favorite venue of Decca, whose engineers knew the hall intimately and how to achieve the best sound with various kinds of music. When I recently was a guest of Decca in London, Tony Griffiths, their digital wiz and general manager, told me he was saddened by the fact that they could no longer use Kingsway Hall for recording because external rumbles and roars and other assorted traffic noises were impossible to control.

In any case, recording engineer Stan Goodall, abetted by Solti, decided to take an ultra-dynamic approach to the percussion in the "Allegretto." The result is brilliant and exciting, with the very large bass drum, tympani, and snare drums explosive in their sheer

Those who revel in big, dynamic sounds will likely prefer Sir Georg Solti's version of these Haydn symphonies over the more reserved renditions.


Sir Georg Solti

weight and sonority. The overall sound is very clean, with all the vaunted advantages that are lent by the Kingsway Hall ambience.

Those who revel in big dynamic sounds will probably prefer this Solti CD, while those with more conservative tastes will be inclined to favor the Hogwood version. *Bert Whyte*

Andrew Lloyd Webber: Requiem. The English Chamber Orchestra and Winchester Cathedral Choir, Lorin Maazel; Placido Domingo, tenor; Sarah Brightman, soprano; Paul Miles-Kingston, treble; James Lancelot, organ. **Angel CDC 7 47146-2.**

Rich in inventively beautiful sonorities and exquisitely shaped melodies, Andrew Lloyd Webber's *Requiem* makes a powerful emotional impact even on first hearing. Its effect grows stronger the more you listen.

Lloyd Webber cites two influences that led him to write the *Requiem*. The first was the death of his father, a church organist and composer, in 1982. While gathering ideas for a work to honor him, Lloyd Webber saw a *New York Times* story about a gruesome war incident in Cambodia. The interplay between his personal loss and the larger suffering of humanity makes his *Requiem* intensely moving.

The melodic ideas in the various movements are related, and derived from a handful of motives. He keeps a melody intact within a movement, and develops it with a rich palette of harmonic, instrumental, and vocal colors—always with a strong sense of a tonal center. His melodic development occurs through the unfolding of these motives to construct the themes for each movement.

There are three basic building blocks. First is the opening "Requiem" theme on the notes do sol sol do. (The falling fourth usually becomes a falling third, but the fourth is significant because it gives the "Recordare" and the "Hosanna" melodies their special angular character.) Second is a decorated diminished seventh chord ("Rex Tremendae" and "Lachrimosa"). The third basic element is a step up followed by a leap down ("Recordare" and "Pie Jesu"). A falling minor third eerily crawling up and down by half steps in the "Ingemisco" is another expression of the step/leap idea.

At the very end, Lloyd Webber returns to the opening "Requiem" motive, quietly sung again by the solo boy treble. Suddenly the organ and tympani interrupt, obscuring his voice with loud, dissonant sounds. Just as suddenly they stop. As the reverberations die away, the boy's voice re-emerges, and you realize that he had been singing *perpetua* through all of that sound. The effect is magical, and capsulizes the emotions of the entire work: The persistence of the human spirit through all of life's difficulties.

Surprisingly, the recording site was not a cathedral or concert hall, but Abbey Road Studio One. Producer David Murray combined the studio's natural acoustics with synthetic ambience to make it *sound* like a minimal-mike cathedral recording, but with some creative departures. Listen to the beginning of the "Hosanna." The aura of reverb around the tenor's voice sounds normal and spacious. But after a quiet horn interlude, the tenor returns. This time, the room sounds larger as he sings *hosanna in excelsis*. You relax, believing the stage is being set for the joyous movement about to follow. Suddenly, on the word *benedictus*, the reverb disappears. The tenor seems to be standing in front of you, saying, "Bless *you!*" Later, the tenor reappears in that less reverberant space, giving the effect of a closeup shot in a film. Then the acoustic space expands again, along with the music. I like this way of using the recording medium, because it provides new ways to communicate artistically.

The album package is well done, with a good balance of informative text and photos. However, after seeing the "Pie Jesu" video, I thought the entire *Requiem* would be an excellent candidate for a CD with subcoded graphics. Those images of suffering and destruction, contrasted with photos from the performance, would make an "illustrated" CD a powerful experience.

Placido Domingo tends to overshadow the other soloists, if only because he is such an exceptional performer. He makes the "Hosanna," with its dance-like syncopations, sparkle. Sarah Brightman seems a bit challenged by her difficult part, but she carries it off quite well. Paul Miles-Kingston sings with a purity of tone, a certainty of intonation, and a depth of feeling that few musicians as young as he are able to provide. Conductor Lorin Maazel draws an exciting and quite moving performance out of the combined forces.

I predict that music schools and church groups all over the country will be eager to perform this *Requiem*. Many movements are suitable for inclusion in a voice recital. Those wonderfully dramatic solo parts will appeal to young singers, and the orchestral parts require a stylistic flexibility that challenges and rewards the players. Andrew Lloyd Webber's *Requiem* should find a treasured place in the repertoire quickly. *Steve Birchall*

The Ives Third Symphony has a spacious, relaxed sonic quality that is bathed in natural ambience.

Ives: Symphony No. 3 and Orchestral Set No. 2. Concertgebouw Orchestra, Michael Tilson Thomas. **CBS MK 37823.**

Strange sounds emerge from this new recording of the Ives Third Symphony. Ghost instruments trail along in foreign keys and disembodied tempos, hovering mysteriously around the music we are accustomed to hearing. The piece is much more complicated than it may have seemed previously.

Everything about this CD is enjoyable, from Ives' imaginative music to the warmly expressive performances by Michael Tilson Thomas and the Concertgebouw Orchestra. To top it off, the spacious, relaxed sonic quality that producer David Mottley recorded with the Calrec Soundfield mike is both detailed and bathed in natural ambience.

The strings of the Concertgebouw provide an especially rich, dark coloring, and the brass match that quality with sonorous, organ-like tones. The woodwinds complement the sound with delicate piquancy. Listen to the opening of the third movement for the liquid legato of the strings, contrasting with the gently separated wind chords.

This is the first recording of the symphony's new Critical Edition, which calls for double rather than single winds, adds tympani, and restores Ives' "shadow" parts. What had seemed a mild-mannered folk symphony constructed from American hymn tunes has turned into the core of a far more subtle and complex multilevel work. This dichotomy between two distinct worlds of thought expresses the Transcendentalist spirit missing from earlier editions.

The ghost instruments are most noticeable in the ethereal violin solos at the ends of the first and second movements. Now, those fading church bells at the end of the last movement take on a much greater significance because they are part of the shadow music, too.

Usually, the ghost music is subliminally inaudible, but occasionally it affects the primary level. Listen carefully about two minutes into the first movement. The harmony seems to drift out of tune because "wrong notes," buried deep in the background, are casting shadows on the main stream of the music, making it sound not quite as safely consonant as it "should" be. Near the movement's end the ghost parts shimmer around the "real" music, suggesting but not confirming their presence, until the shadow violin materializes briefly. Regrettably, the program notes in the booklet mention the new edition but don't describe the substantial changes it represents.

The final movement of the "Orchestral Set No. 2" is based on a national tragedy, the sinking of the *Lusitania* by a German submarine. In Ives' profoundly emotional music we hear the same stunned state of consciousness and roller-coaster emotions that all of us have experienced after national tragedies, such as the assassination of John F. Kennedy or, more recently, the TWA hostage crisis.

This is really the score for a music video, with Ives himself walking through the scenes and reporting his impressions. In the middle, he transforms the hymn tune "In the Sweet Bye and Bye" into a terrifying dirge, wildly careening between hope and despair. Fragments of other melodies filter in and out of Ives' complex web of thoughts. This is not easy or "pleasant" music to hear, because it is concerned with other emotions, but it can leave you in tears. *Steve Birchall*

Illustration: Rick Tulka

Smetana: String Quartets Nos. 1 and 2. Smetana Quartet. **Denon 33C37-7339.**

An interesting recording from both musical and technical viewpoints.

As you might expect, the Smetana Quartet is more than familiar with the music of Smetana. In fact, it's in the blood of these Czech musicians, as

This clean-sounding CD of Smetana works is derived from one of the earliest digital recordings, made in 1976.

evidenced by their splendid performances of the tuneful string quartets here. The Smetana Quartet players have been together for more than 30 years, and their rapport and superb musicianship are very apparent. When the Smetana Quartet was first organized the second violin was played by Vaclav Neumann, who later became the well-known and highly regarded conductor of the Czech Philharmonic.

This CD is derived from one of the very earliest digital recordings, made by Denon in February 1976 in the Supraphon studios in Prague. As such, it probably was recorded on Denon's early 13-bit digital recorder. In spite of this it is still a good, clean recording, although the strings are fairly bright. Recorded rather close-up, it has been furnished with sufficient reverb to smooth out its sonic contours. Although error correction and concealment were fairly primitive in a digital recorder of that vintage, very few dropouts are evident. Denon is certainly to be commended for these pioneering forays into digital. *Bert Whyte*

Smetana Quartet

Verdi: Overtures. The Vienna Philharmonic Orchestra, Giuseppe Sinopoli. **Philips 411 469-2.**

Opera lovers are naturally quite familiar with the overtures to many of their favorite operas. In the nature of things, some operatic overtures stand on their own as interesting musical works. In fact, some overtures prove to be better music than the operas they precede.

It must be noted that the orchestras of the great opera houses—the Metropolitan, Covent Garden, La Scala Milan—are reasonably good ensembles. However, they certainly are not in the same league as the likes of the "big five" (Chicago, Cleveland, New York Philharmonic, Boston, and Philadelphia orchestras), to say nothing of the Concertgebouw Orchestra or Berlin Philharmonic. The great exception is Vienna, where the Vienna Philharmonic also plays at the Staatsoper. Thus, when an opera lover can listen to this CD and hear his favorite overtures performed by a great symphony orchestra with opera experience, he is made painfully aware of the shortcomings of other "house" orchestras.

Conductor Giuseppe Sinopoli is the new star in the Philips recording firmament, said to lead outstanding performances of operas, and, surprisingly, to be a gifted Mahler interpreter. In fact, Philips has already begun to record him in some Mahler works.

On this CD, Sinopoli impresses with his mastery of popular overtures from Verdi's "Aida," "La Traviata," "The Masked Ball" and "I Vespri Siciliani," as well as the less well-known overtures from the composer's "Attila," "Luisa Miller" and "Nabucco."

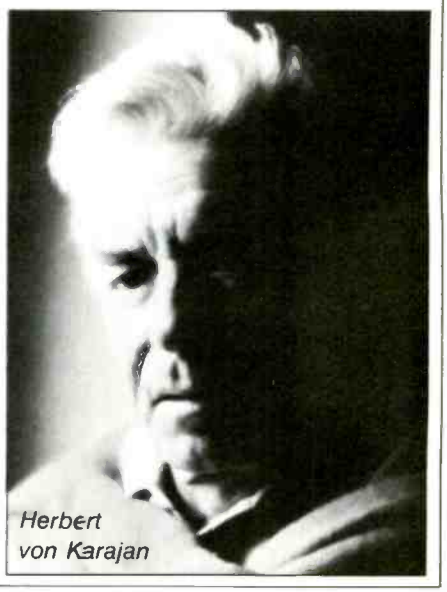
The Vienna Philharmonic plays these pieces with their vaunted string sound and dashes off the more athletic works with great panache. The warmth of the ambience suggests they were recorded in the Sofiensaal in Vienna, with a super-clean, brilliant sound, very wide in dynamics. *Bert Whyte*

Bizet: L'Arlésienne Suites 1 & 2, Carmen Suite. Berliner Philharmoniker, Herbert von Karajan. **Deutsche Grammophon 415 106-2.**

If you get a bang out of Bizet, you'll like the generous helping of his music in this fine CD recording of the ingratiating "L'Arlésienne Suites 1 & 2" and an abbreviated "Carmen Suite."

As always, von Karajan demands and gets stellar playing from his superlative Berlin Philharmonic Orchestra. The ensemble precision in the string section is a testament to his iron discipline and musicianship. Occasionally, this kind of perfection can get a little too glossy and the performance a bit too literal. However, when von Karajan is in his element, he is masterful.

His readings of these pieces are not lacking in atmosphere and he emphasizes very wide dynamics. The engineers give him a typical DG recording—dotting every "i" and crossing ev-



Herbert von Karajan

Shadowfax's percussionist is probably best served here. His punctuations literally draw your eyes and ears to points along the stereo spectrum.

ery "t"—but all is very clean and open. Although recorded fairly close-up, the high strings are blessedly not wiry, but they are bright. A warm ambience helps to provide a reasonably natural perspective. *Bert Whyte*

Mozart: Concertos Nos. 19 and 23. The English Chamber Orchestra; Murray Perahia, piano.
CBS Masterworks MK 39064.

On this CD, the fleet-fingered piano virtuoso Murray Perahia continues his series of Mozart piano concerto recordings, providing us with eloquent, graceful performances of the 19th and 23rd. His playing is quite expressive, with excellent articulation.

Bob Auger, a highly regarded British recording engineer, has provided a sumptuous, high-definition recording in the warm ambience of St. John's, Smith Square, in London. The piano sound is just slightly forward of the orchestral accompaniment, a nice balance that affords good projection. The piano has an almost liquid smoothness, yet transient attack is crisp and overall clarity is very good. Auger achieves a recording of considerable depth, with a broad stereo sound stage. The high strings are clean and sweet, with no wiry edge.

Perahia conducts the English Chamber Orchestra from the piano, and he gets excellent playing from this highly accomplished group. *Bert Whyte*

Honegger: Symphonies Nos. 3 and 5. The Bavarian Radio Orchestra, Charles Dutoit.
Erato ECD 88045.

In general, the works of Arthur Honegger have not fared well since his death in 1955. There is associated with much of his writing a hard-edged, mordant quality which stands in contrast with most of his *Les Six* contemporaries. These two works underscore that nature, and the music does not win friends easily.

We have come to speak of Charles Dutoit and the Montreal Symphony Orchestra in the same breath, because of their very successful recordings of French music on London Records. And here Dutoit is doing much the same on the Erato label with a German orchestra!

Recording quality is excellent. One senses a basic pickup, with a minimal number of accent mikes. Fore/aft orchestral balances are appropriate, and the reverb is moderate. The many intricacies of Honegger's orchestration are beautifully clear, and the bottom end is solid and never overdone.

The Third Symphony carries the subtitle "Liturgique." Its first movement, "Dies Irae," fairly bristles with anger. It soon gives way to a gorgeous adagio, "De Profundis," which is the essence of Honegger's unique harmonic palette. The work closes with a "Dona Nobis Pacem" whose strange, dragging, march-like opening seems to have little to do with the movement's title. By the end, though, it is transformed into the vision of peace which we expect.

The Fifth Symphony is subtitled "Di tre re," referring to the ending of each of the three movements on the note D (re, in solfége), played by the timpani.

Until now, the finest performances of Honegger have appeared on the Supraphon label, with Serge Baudo conducting various Czech orchestras. Dutoit's traversal of these works shows him to have as much feeling for the music as has Baudo, and he has the advantage over Supraphon in technical matters. More Honegger from Dutoit and Erato is eagerly awaited, at least by the people in this household.
John M. Eargle

Shadowfax

The Dreams of Children: Shadowfax
Windham Hill WD-1038.

Sound: B+ Performance: B

The Dreams of Children is Shadowfax's third and most incisive recording since the group reformed a few years ago. Named after Gandalf's horse in *The Lord of the Rings*, they continue to create a fantasy-filled fusion, delicately balanced and teeming with exotic ethnic references. They're essentially a composer's band, with complex, richly textured arrangements that exploit the interplay among acoustic, electric, and digitally synthesized instruments.

One of the highlights of this CD is the contrast and confluence between David Lewis' Yamaha DX-7 digital synthesizer and the acoustic percussion of drummer Stuart Nevitt and guest percussionists Michael Spiro and Adam Rudolph. Sprightly, circular polyrhythms emerge on "Word from the Village" and "Kindred Spirits," with log drums and DX-7 percussion forging a future-primitive landscape.

Stuart Nevitt is probably best served by this CD recording. The depth and punch of his drums drive heroic pieces like "The Big Song" and provide an earthy palette of colors to the stone-flute melody of "Another Country." His punctuations literally draw your eyes and ears to different points along the stereo spectrum.

Chuck Greenberg, one of the main composers, switches among acoustic

Studio technology and brilliant engineering enhance Michael Hedges' complex style and take *Aerial Boundaries* beyond true-to-life fidelity.

saxophones, stone flutes, and the Lyricon, a synthesized wind instrument. His "The Dreams of Children" is a delicate tune of affirmation. The Lyricon is played in the flute range, but with a glissando that slides through the scenic swirls of violinist Jamii Szmadzinski and synthesist Lewis.

Michael Hedges

Although cultural interplay is the seasoning of their music, Shadowfax's ethnic forms can be cloying in the long run. Guitarist G. E. Stinson comes perilously close to cliché on his "Word from the Village" and the crunching Middle-Eastern bends of "Above the Wailing Wall." On the other hand, his sustained solo work on "The Big Song" makes that cut soar.

The music of Shadowfax is like a hand-embroidered Persian rug, full of colorful designs and details that are beautifully captured in the digital format. It would have been nice if Windham Hill could have lowered the noise floor of the analog recordings, but the CD is still the preferable format for *The Dreams of Children*. *John Diliberto*

Aerial Boundaries: Michael Hedges
Windham Hill WD-1032.

Sound: B+ Performance: A-

Capturing solo acoustic guitar is as simple and pure a recording project as you can find: A guitarist, a couple of microphones direct into a two-track machine, and you're done. However, producers William Ackerman and Steven Miller add new life to that timeworn formula on Michael Hedges' atmospheric *Aerial Boundaries*. If you're looking for a pure, real-life acoustic guitar disc, then this isn't the record for you. Studio technology and brilliant engineering enhance Hedges' complex style of finger-picking guitar and take *Aerial Boundaries* beyond true-to-life fidelity.

Hedges has the intricate, circular style of rhythm and melody that acoustic guitarists like Ackerman and Leo Kottke have perfected. On the title track, his mesmerizing cycles are broken up with bursts of plucked harmonics. The studio delay that's used, probably a Lexicon, creates a subtle counter-rhythm, and his bass slaps and slides are rich enough to be an acoustic bass.

Hedges isn't a storytelling guitarist like John Fahey or Alex DeGrassi. His pieces are more like emotional meditations, filling "Rickover's Dream" and "Ragamuffin" with unexpected punctuations and jolts. The dynamic range he traverses is wide, as he shifts from subtle picking to harsh slashes at a moment's notice.

This isn't to say that Hedges is going to take the top of your head off. His dramatic effects are contained within the inviting, contemplative framework of his songs. After all, how shocking can you be when you have an acoustic bass playing the lead melody of "After the Gold Rush"? The warm tone and subtle note-shaping of bassist Mike Manring are captured with every nuance intact on this cover of the Neil Young chestnut.

The faintly exaggerated stereo separation and reverberation form a wide spatial field for Hedges to travel through, but that's not enough for this adventurous player. "Spare Change," recorded at the Peabody Electronic Music Studios in Baltimore, has Hedges waving at himself going backwards in an ethereal tone poem.

The audio unity of this CD is surprising considering it was done in three different formats and five different studios. The two-track direct-to-digital recordings are crisp and warm and the two-track analog pieces would have been considered audiophile quality in an earlier day. Only "Ménage à Trois," a lament for multi-tracked flute and bass, suffers marginally from tape noise. *Aerial Boundaries* is a thoughtful statement by Michael Hedges and the recording only enhances a powerful performance. *John Diliberto*

Without Rhyme or Reason: Scott Jarrett
GRP D-9518.

Sound: B Performance: D-

The question that should be asked is, why? Why issue a Compact Disc of a 5-year-old record that justifiably sank without a trace, whose only raison d'être is that the artist has an internationally famous brother? *Without Rhyme or Reason* is Scott Jarrett's debut from 1980 and his only recording to date. And yes, he is the younger brother of the impetuously brilliant jazz pianist Keith Jarrett, who makes an appearance on two tracks. But make no mistake, despite Keith's appearance

Though it's well recorded, Scott Jarrett's CD, at a scant 35 minutes, runs short in quantity as well as in quality.

along with jazz veterans like Toots Thielemans, Marcus Miller, Eddie Gomez and Ralph MacDonald, this is not jazz. That's not the problem. The problem is that it's completely vacuous.

Scott Jarrett is a refugee from the commercial jingle factories and he sounds like it. He has a pleasant but inflexibly thin soprano voice and a nice touch on acoustic guitar, but he writes soft-rock songs that fall somewhere between mellow MacDonald's commercials and a Holiday Inn lounge act. There's a lot of light funk grooves, but the tepid arrangements give them the dynamic punch of flat Coke.

Again I ask, why? With a backlog at the CD plants, why resurrect a record that tried so desperately to just fade away? Simply, GRP Records had the foresight to record this digitally, and now they can try to recoup their losses in a high-demand market.

To be sure, it's a well-recorded product, with clean, crisp (albeit faceless) arrangements and a nice contrast between Jarrett's plaintive guitar and the reverberance of producer Dave Grusin's electric keyboards. But at a scant 35 minutes it shortchanges the CD buyer in quantity and quality. It should be telling that Jarrett never recorded a follow-up. *John Diliberto*

Falla: The Three-Cornered Hat. L'Orchestre de la Suisse Romande, Ernest Ansermet.
London 414 039-2/10.

The music on this CD is a prime example of the treasures buried in the vaults of the major record companies. There are countless thousands of splendid analog tape recordings, the majority of which can be quite successfully transferred to CD, with sonic qualities superior to the original issue on vinyl. This recording of Falla's tuneful *Three-Cornered Hat* ballet proves that even pre-Dolby tapes can be sonically and musically rewarding. Played at good room-filling levels, residual tape hiss is most pleasingly low.

Working in 1961 in Victoria Hall, Geneva, the London/Decca engineers provided a clean, wide-range, highly dynamic recording. In terms of internal balances, detail, and an acoustic perspective that affords a wonderful sense of depth, it conveys a feeling of realism as good as that provided by many current recordings.

Ernest Ansermet was an acknowledged master with this kind of music and he always managed to get his Orchestre de la Suisse Romande to play at the top of their form.

I think the clarity and cleanness and sheer musicality of this 1961 recording will amaze you. *Bert Whyte*

Kodaly: Háry János; Prokofiev: Lieutenant Kijé. The London Philharmonic Orchestra, Klaus Tennstedt.
EMI CDC 747109 2.

The "Háry János Suite" and "Lieutenant Kijé Suite" have been a logical coupling on a number of recordings over the years. Both works are colorfully orchestrated and have long been used as sonic display pieces.

All the stranger, then, that out of what apparently was the same recording session, the "Háry János" is merely a good-sounding recording with a rather pedestrian performance, while the "Lieutenant Kijé" is a supercharged, high-definition recording and a brilliant reading. Klaus Tennstedt elicits an exuberant, earthy performance of this delightful score from the London Philharmonic Orchestra. His is a tongue-in-cheek approach that deftly burlesques the pomposity of the Soviet officialdom which created the fictitious Lieutenant Kijé. After the "Wedding Scene," Tennstedt traverses the "Troika"—the sleigh ride—at such a breathtaking tempo that the good Lieutenant and his bride must surely be dashing for their dacha replete with blazing fire, caviar blini and a bottle of Stolichnaya!

Klaus Tennstedt

The playing is first rate, the sound well balanced, broadly dynamic and as clean as virgin snow on the steppes! EMI doesn't yet have a very substantial CD catalog, but one hopes they will soon add more recordings of this splendid quality. *Bert Whyte*

Jazz at the Pawnshop: Arne Domnerus, Bengt Hallberg, Georg Reidel, Egil Johansen, Lars Erstrand
Proprius-AudioSource CDP 778/9, two-disc set.

The LP version of this recording has been a demonstration favorite of audiophiles for many years. Now it is available as a two-disc set on CD, and in a direct comparison with the LPs, I can assure you the transfer is a complete success. There is a small amount of tape hiss, of course, but at least on Compact Discs the sound gains in clarity from the absence of surface and impulse noise.

Recorded with simple mike techniques, it is very atmospheric, with the crowd noises and applause adding a touch of realism from the nightclub locale. The recording is relatively close-up, has great presence, and is notable for its clean sound. There are sharp transient attacks on piano, percussion and vibraphone, and a fine natural sound from alto sax and clarinet. This jazz group plays very well indeed, with solid, freewheeling traversals of such standards as "Limehouse Blues," "Lady Be Good," "How High the Moon" and similar fare. How nice to have this famous recording on CD. *Bert Whyte*

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West Side Story is so clear and detailed that you don't need to follow the score. Everything in it is completely audible.

Leonard Bernstein: West Side Story. Kiri Te Kanawa, soprano; Jose Carreras, tenor; Tatiana Troyanos, mezzo-soprano; Kurt Ollmann, tenor; Marilyn Horne, mezzo-soprano; Leonard Bernstein conducting. **On the Waterfront.** The Israel Philharmonic Orchestra, Leonard Bernstein conducting.
Deutsche Grammophon DG 415 253-2, two-disc set.

Leonard Bernstein's new recording of *West Side Story* sizzles and pops with all the extroverted energy that characterizes Broadway musicals. The unusual twist is his use of operatic voices. But why not? After all, this is one of the greatest of all American operas, masquerading as musical theater. Or is it the other way around?

Jose Carreras and Kiri Te Kanawa make an outstanding Tony and Maria, projecting the qualities of youthful innocence convincingly. Carreras gives Tony's first song, "Something's Coming," an aching, searching quality that captures a teenager's outlook on life. His treatment of "Maria" is both tender and strongly affirmative.

The balcony scene is especially moving. Carreras and Te Kanawa respond to each other musically and dramatically so well you forget the performance and are absorbed by the story and the music.

In "I Feel Pretty," Bernstein's tempo is slower than is customary in stage presentations. Originally, he conceived it as a lyrical, elegant song, rather than the excited, up-tempo version used in the theater. After ending the first act with two dead bodies on stage, directors want something bright and cheerful to open Act Two. But for a recording, the original conception is perfect. Kiri Te Kanawa sings it with the peaceful contentment of a young princess aglow with the joy of new-found love. The girls mock her "delusion" with gentle teasing rather than the sarcasm created by a faster tempo. It works beautifully.

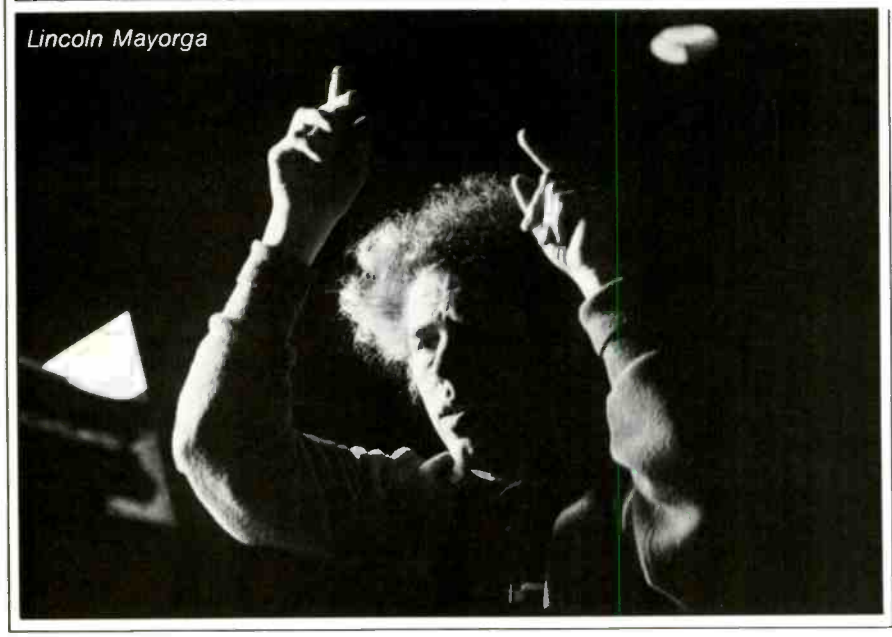
Kurt Ollmann is not well known to American audiences, but his portrayal of Riff should help to correct that. Listen to his macho, streetwise singing in the "Jet Song" and "Cool" and his unmistakably powerful, confident leadership of the Jets in the "Tonight" ensemble.

Anyone who has been through music school will recognize all the academic devices Bernstein cleverly turned into highly expressive musical ideas. Throughout the score, the forbidden melodic interval of the tritone (augmented fourth) is important. Known as the "devil's leap" because it is difficult to sing, it becomes the germinal motive of Tony's big solo, "Maria." The Jets' street signal motive is a tritone leap, too. The device also figures prominently in the harmonic structures, and is responsible for those ghostly chords at the end of the second act.

Rhythms are another challenge for the singers. Riff's "Jet Song" has passages where the melody is slightly off the beat for an entire phrase at a time—not easy to perform. In "America" the medieval rhythmic device called hemiola becomes, strangely, a jazz reference. You can hear it on the word America. The previous bar has the normal grouping (for 6/8 meter) of two beats with three subdivisions (1-2-3, 1-2-3). But the second bar is the surprise: Three beats, each with two subdivisions (1-2, 1-2, 1-2). Every time the word America occurs, so does this unexpected syncopation, slashing across the beat.

Just before the rumble scene, the ensemble piece based on "Tonight" features five-part counterpoint. Every character has different expectations about the evening's events, so each one sings about them with different melodies, all intertwined. It's an extraordinary passage musically, but it also succeeds in making an important dramatic point in exactly the right way.

The two comic songs, "America" and "Gee, Officer Krupke," are absolute gems. To hear Kurt Ollmann doing the voice of the social worker in falsetto is hilarious.


Lincoln Mayorga

The Missing Linc: Lincoln Mayorga & Distinguished Colleagues
Sheffield Lab CD-S10.

Missing Linc, Vol. 2, Sheffield's second direct-to-disc recording, was largely responsible for establishing the company as a major factor in high-quality sound reproduction.

Now we have the CD recording, which was derived from the analog reference tape that was made simultaneously with the direct disc. Listening to it now, it is easy to perceive why its musical and sonic values caused such a stir. Tape hiss reminds you of its analog origin but it is not at all obtrusive, and the many high-level passages mask it completely.

I compared my original *Missing Linc* direct-to-disc recording with this CD. I'm bound to say that while the CD's sound is quite clean, the LP sounded

Robert Shaw reveals the rhythmic momentum of the "Symphony of Psalms," with choral accents and spaces between notes giving the music forward motion.

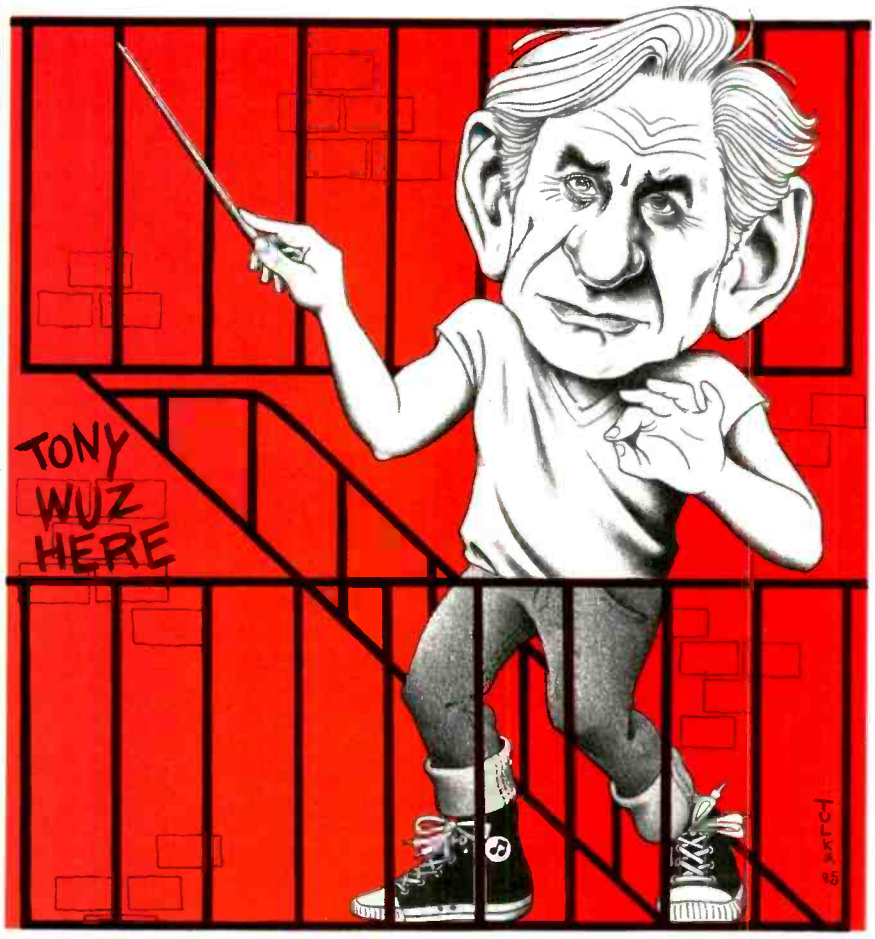


Illustration: Rick Tulka

Near the end, the duet between Anita and Maria ("A Boy Like That" and "I Have a Love") is one of the most intense moments of the Broadway stage. By combining the two songs contrapuntally, Bernstein expresses the dramatic conflict between Anita and Maria with soul-shattering power. Tatiana Troyanos (Anita) sings with bitter, vitriolic feelings against Te Kanawa's gently innocent pleading. When they reconcile their feelings at the end, I feel my eyes watering.

John McClure, a long-time friend and associate of Bernstein, produced this recording. It is multi-miked and multi-tracked, and is an outstanding example of how good that production style can be. This recording is so clear and detailed that you don't need to follow the score—everything in it is audible. (In the BBC documentary on the sessions, shown here on PBS, you can see Bernstein actively participating in the mixdowns.)

By turns passionate, introspective, lyrical and energetic, this recording of *West Side Story* bubbles over with a great deal of good, old-fashioned American energy.

A bonus for CD listeners is the inclusion of Bernstein's symphonic suite from *On the Waterfront* performed by the Israel Philharmonic. It's a powerful, imaginative score from an outstanding film.

Steve Birchall

cleaner still, in spite of its wear, with better transient response, more (and better defined) bass, and a more extended high-frequency response. Nonetheless, for those who can't afford the $450(!) being asked for a mint-condition, unused *Missing Linc* direct disc, the CD will serve quite well to explain its landmark significance.

Bert Whyte

Stravinsky: Symphony of Psalms; Poulenc: Gloria. The Atlanta Symphony Orchestra and Chorus, Robert Shaw; Sylvia McNair, soprano.
Telarc CD-80105.

Serene and glowing, this new recording of Stravinsky's "Symphony of Psalms" is an excellent addition to the CD repertoire. Coupled with it is Poulenc's "Gloria."

Both works are Robert Shaw specialties, and these new performances admirably reflect his long association with them. For instance, in the "Symphony of Psalms" the intricately woven lines of the second movement's double fugue have a clarity and definition I have never heard in a recording before. The room quality is reverberant without covering up the detail.

If you have the impression that the highs are missing, remember that Stravinsky omitted violins, violas, and clarinets from the orchestra. He wanted a less bright sound for this work. The beginning sounds especially dull because Stravinsky wanted to plant that sonic character in the listener's mind.

Robert Shaw reveals the rhythmic momentum of the "Symphony of Psalms" in just the right ways. Choral accents and slight spaces between notes help to give the music an almost danceable lift and forward motion. In


Robert Shaw

Tunnel is utterly clean, with sound that is highly defined and transients that are razor sharp.

Flim & The BB's

the last movement, these accents give the effect of large tolling bells overlapping each other.

Shaw's chorus sings the words *laudate* and *alleluia* in the last movement with beautiful control, creating the peaceful, tranquil effect Stravinsky wanted. Every nuance of tone quality and phrasing seems exactly right. The movement opens with a crescendo/diminuendo effect, accomplished mainly through Stravinsky's calculated orchestration, but also by the Atlanta Symphony's good playing. The chorus answers it with a perfectly controlled dynamic swell, a sudden drop in volume, and a final tapering-off (on the word *alleluia*). Near the end, Stravinsky's glowing choral/orchestral chords, with their widely spaced intervals, are balanced to perfection.

The Poulenc "Gloria" receives a lively, playful performance. Shaw and the Atlantans obviously enjoy this work and their enthusiasm makes the performance memorable. Soprano Sylvia McNair sings with elegance and clear, ringing tones.

The "Gloria" benefits from a more successful recording than the "Symphony of Psalms." The pickup seems to be a little closer, and more like other Telarc recordings with the Atlanta Symphony. The sound quality in the Stravinsky is a bit unsettling in isolated places, possibly because of a mike placement that didn't quite work. Everything sounds fine until the level goes up; then the chorus begins to sound harsh. Also, the chorus covers up certain instruments in the tuttis just enough to confuse the ear into perceiving the combined sound as distortion.

Perhaps strong and slightly out-of-phase reflections from the room boundaries interfered with the direct sound at the mikes, causing this distortion. But even if Telarc didn't quite hit the mark, the sound is still good, and the performances are beautiful.

Steve Birchall

Tunnel: Flim & The BB's
Digital Music Products CD-447. (Available from Digital Music Products, Rockefeller Center Station, P.O. Box 2317, New York, N.Y. 10185.)

This CD is another stunning example of recording engineer Tom Jung's digital wizardry.

Tom worked with the multi-talented Flim & The BB's on the great *Tricycle* recording. And way back in his Sound 80 studio days in Minneapolis, Tom made a pioneering digital recording with this same group.

There are 11 original compositions on this CD, ranging from hard, driving rock to expressive, less athletic, elaborately scored pieces. In all of them, Flim & The BB's display great virtuosity, and they create an astonishingly big sound considering that the group consists of just four musicians. The arrangements are complex and brilliant, and the sonorities—produced from synthesizers, saxes, flute, clarinet, piccolo, Fender Rhodes guitar, acoustic piano, and electric bass—plus tympani and an elaborate percussion battery, are of breathtaking realism.

This group has been recording in the digital format for a long time, and they have learned to use the medium in their music making. A case in point is their exploitation of dynamic range, which in this case is extremely wide. The synthesizers explore subterranean bass and, along with piccolo and high percussion, the stratospheric extremes of high frequencies.

All is utterly clean, clothed in clever and selective reverberation, with a highly defined sound and razor-sharp transients. Even if you have amplifiers and speakers that can handle sound of enormous energy, this recording will tax them to their limits. *Bert Whyte*

Bruckner: Symphony No. 7 in E Major. The Staatskapelle Dresden, Herbert Blomstedt.
Denon 38C37-7286.

Bruckner's monumental Seventh Symphony is given a quite convincing performance by Herbert Blomstedt conducting the excellent Staatskapelle Dresden.

The recording was made in the spacious acoustics of the Lucaskirche in Dresden, with a pair of overall spaced omni mikes plus a minimum number of discrete sweetener mikes. The sound exhibits a distant perspective but still maintains good detail. First violins are fairly smooth, brass is properly massive and well projected, and percussion is quite clean with good impact.

The fine Staatskapelle Dresden and the splendid acoustics of the Lucaskirche provide a quite compelling musical experience. Blomstedt does not attain the level of inspiration of a von Karajan in this great music, but his performance is more than adequate.

Bert Whyte

Berlioz: Hungarian March; Ravel: Pavanne for a Dead Princess; Dukas: Sorcerer's Apprentice; Saint-Saëns: Danse Macabre; Debussy: Afternoon of a Faun; Chabrier: Joyeuse Marche. Academy of St. Martin-in-the-Fields, Neville Marriner.
Philips 412 131-2.

Neville Marriner and his splendid Academy of St. Martin-in-the-Fields have given new life to this potpourri of tired old warhorses. All the selections receive brisk, spirited performances, without any slighting of their lyrical elements.

This is a multi-mike recording that offers a big, clean sound with plenty of power, couched in a fairly spacious acoustic ambience. Recorded a bit close up, it has plenty of detail, and an outsized bass drum has great impact in the highly dynamic climaxes. If you like these works, this fine recording will delight you. *Bert Whyte*

Ravel: Orchestral Works. Orchestre Symphonique de Montreal, Charles Dutoit.
London 410 254-2.

All of the Charles Dutoit/Montreal Symphony Orchestra recordings are marvelous, but this CD's rendition of Ravel's wondrously orchestrated "Mother Goose" ballet is a masterpiece—a near miracle.

Every element that contributes to a great recording is here in abundance on the "Mother Goose" (and also on the other Ravel works, which are equally well played and superbly recorded). Dutoit's performance is quite

Itzhak Perlman's violin on the Prokofiev CD sounds beautifully burnished, and is nicely complemented by a balanced orchestra.

simply the best I have ever heard, and he has his Montreal orchestra playing like a world-class ensemble.

The sound is ravishing. If ever there was a recorded sound to completely document and delineate the advantages of the digital recording process, this is it! Even with an anti-digital bias, no rational, open-minded person with normal hearing acuity could possibly fault this recording.

On a recent trip to London, I was a guest at the Decca Records complex and had the pleasure of meeting John Dunkerley, the engineer who records these superb Montreal performances. He told me that the St. Eustache Church, the recording locale between Montreal and Quebec City, has a virtually ideal interior balance of stone and wood which gives the sound its wonderfully natural warmth and character.

Make no mistake: Played back on an audio system of the highest quality, this recording imparts a realism to the music that can be bettered only in live performance. This CD is an absolute must! *Bert Whyte*

Chopin: The Nocturnes, Volumes 1 and 2. Artur Rubinstein, piano.
RCA RCCD 106 and 107, import.

These are legendary performances recorded in the RCA Italiana studios in the mid-'60s. Little needs to be said about Rubinstein's playing, except that he performs these works as well as anybody possibly could.

What does need to be said is that the recording quality is absolutely stunning. During the bulk of the '60s, RCA's classical activities centered on three-channel recording at 30 ips. After a brief bout with Ampex Master Equalization (AME) in the late '50s, RCA's recording department developed their own playback curve for the higher speed, and they beefed up the record stages of their tape recorders. The results were master recordings of exemplary quality with excellent time-base stability and quite low noise. Only when multi-track recording came in did RCA convert to Dolby A.

In making the digital transfers, producer Max Wilcox went back to the original half-inch masters and rebalanced them, mixing in a little less of the center channel than in the earlier issues of these recordings. The result is a sense of greater space, with a little more left/right delineation. What is utterly surprising is how quiet everything is; you have to listen at higher than normal levels to hear any tape hiss. They really had their technical act together back then. *John M. Eargle*


Itzhak Perlman

Serge Prokofiev: Concertos for Violin and Orchestra, No. 1 in D Major and No. 2 in G Minor. The BBC Symphony Orchestra, Gennady Rozhdestvensky; Itzhak Perlman, violin.
EMI CDC 7 47025-2.

From the start, Prokofiev's mordant and angular writing has tended to dominate his brooding lyricism. The "Concerto No. 1 in D Major" was premiered in 1923, and it probably was his first large work in which the lyric strain was dominant. It was composed at the same time as the advanced (and often noisy) "Scythian Suite" and "Chout" ballet. The outer movements are slow, and the wistfulness of the violin writing seems to have been matched only by Walton, in his violin concerto of 1939. The middle movement, a contrasting scherzo, is the ideal tonic.

Perlman is probably the best romantic player among today's younger violinists, and his efforts are perfectly complemented by Rozhdestvensky and the BBC Symphony Orchestra. The violin sound is burnished and the orchestra well balanced.

The second concerto on this disc dates from the mid-'30s and reflects the advancing times. The movements are in the more usual fast-slow-fast plan, with lyricism a lesser ingredient.

A beautiful CD, and highly recommended. *John M. Eargle*

Sibelius: Violin Concerto; Saint-Saëns: Introduction and Rondo Capriccioso. The Philadelphia Orchestra, Eugene Ormandy; Dylana Jenson, violin.
RCA RCD14548.

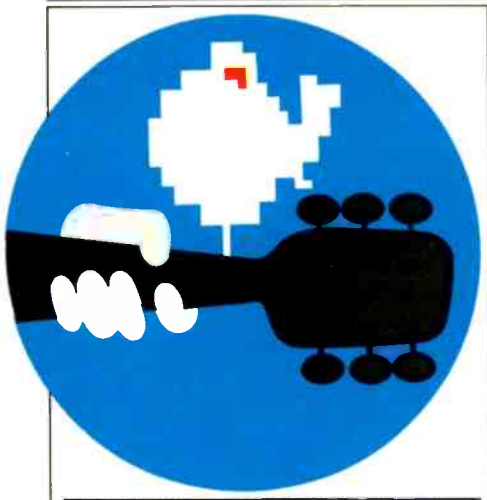
Dylana Jenson, a violin virtuoso, made quite a splash when, at the age of 17, she won the Silver Medal at the 1978 Tchaikovsky Competition in Moscow. She was also acclaimed for her 1980 performance of the Sibelius "Violin Concerto" with Ormandy conducting the Philadelphia Orchestra. Since then, she has performed widely here and abroad. In spite of this promising launch to her career, she has not made the impact nor gained the prestige of other violin *Wunderkinds* of the Tchaikovsky Competitions.

More is the pity, for on this CD, documenting her 1980 appearance, it is clear why her performance of the Sibelius "Violin Concerto" was such a triumph. Not only has she a formidable technical armamentarium, but she plays with great expression and lyricism, with a lovely, smooth, sweet tone that is captured perfectly here.

My former RCA colleague, Paul Goodman, knows how to cope with the acoustics of the Scottish Rite Cathedral in Philadelphia. He has struck just the right balance between orchestral detail and the hall reverb. He has Miss Jenson ideally placed just in front of the orchestra, and her violin sound is always completely articulate. The late Eugene Ormandy always had a way with the music of Sibelius, and his accompaniment is entirely sympathetic. Needless to say, the Philadelphia Orchestra plays with its usual élan.

Smooth, clean sound in general marks this as one of RCA's better CDs. The Saint-Saëns piece is a pleasant, well-played filler. *Bert Whyte*

Woodstock is enjoyable not only as a document of an occasion but also as a compendium of musical styles of the '60s.



Woodstock: Various Artists
Mobile Fidelity MFCD 4-816, four-disc set.

Putting the *Woodstock* and *Woodstock Two* albums on CD is a wonderful idea. But could the sound quality be good enough to be viable on CD? Considering all the problems of recording the Woodstock festival, this might have become a very accurate reproduction of a less-than-satisfactory recording. Happily, Mobile Fidelity has made a CD version that is quite enjoyable.

Don't expect to hear perfection in audio engineering, though. All the defects of the original are present: Hums and buzzes from the sound reinforcement system; distortion from unsatisfactory mike placement, occasional equipment mismatches and performers moving around onstage; murky, muddy sound quality; the problems of an analog tape made live nearly 16 years ago (even occasionally bad tape-to-head contact is audible on the CDs); rounded-off attack transients; little sense of depth or dimensionality (after all, this was an outdoor concert, and no walls means no room acoustics); limited dynamic and frequency ranges, and less-than-perfect performances from exhausted performers (balanced by outstanding ones stimulated by the excitement of the event).

If you can set these problems aside and listen to the music, you will be impressed by Mobile Fidelity's success in transferring the *Woodstock* tapes to CD. Woodstock, the event, defined its period. It became the greatest expression of what those times were like, and the musical styles and techniques contained on this four-disc set reflect the way people thought and acted. *Woodstock* and *Woodstock Two* really come to life on CD. As I listened, I could not keep out thoughts of people I knew at the time, places where I lived, politics, free speech, civil rights, Vietnam, peace, love, flower children, and granola. The slightly antiquated sound quality reproduced so faithfully on CD separates Woodstock from the present time in a gracefully nostalgic way.

Most of the best-sounding cuts involve a solo performer or small group and one or two mikes. The big groups like Santana, Jefferson Airplane, and The Who sound muddy, usually because of too many mikes, or the wrong mikes, or less-than-optimum placement. Most of my criticism of sound quality is directed at the original recording (with a sympathetic understanding of the problems involved).

Arlo Guthrie's "Coming into Los Angeles" is one of the more successful cuts in terms of sound quality. The stereo spread is good, the detail from the backup group comes through, and the pickup on Guthrie's voice is smooth, natural and well-centered. The bass is a bit weak compared to other cuts included on the discs. Because of the outdoor setting, not much sense of depth is present.

Joan Baez' performance is fascinating. It's a reminder of the '60s folk/protest style, but the political overtones reach right into the present. When her husband, David Harris, refers to "Ronald Ray-Guns-Zap," he could just as easily be talking about the current "Star Wars" military strategy as Reagan's stormy relationship with the free-speech movement at the University of California in the '60s.

Listen to Baez' clear, ringing voice with that wonderfully wide vibrato, which is her trademark, on "Joe Hill." To hear her singing this song at such a momentous occasion, with all the clarity the CD medium can project, sends chills down my spine. The balance of her voice against the acoustic and electric guitars is exactly right.

Woodstock had a few artistic disasters along the way. Crosby, Stills, Nash and Young were very much an embryonic group at that time. They had not had time to prepare live-performance versions of their exquisitely refined studio work, and what we hear almost amounts to an open rehearsal. They admit it, saying to the assembled multitude, "This is the second time we've played in front of people, and we're scared. . . ." But they rose to the occasion, and we are treated to a rare, inside glimpse of a performance in process, complete with rough edges and a few wrong or missed notes.

Santana was virtually unknown before Woodstock, but not after. A few weeks later, I went to hear Arlo Guthrie in Cincinnati. The backup group was Santana, and everyone was wondering what they would sound like after all the clamor at Woodstock. Guthrie wisely came on first, and let them finish off the evening. (I had just finished graduate school and had begun my first job, professing music at Wilmington College. As the evening wore on, I joined a long line of snake dancers and danced until I reached total exhaustion—rock does strange things to people. At that point, two of my students, in similar condition, found me collapsed on the floor, shirtless, huffing and puffing, with rivers of sweat pouring down my chest. My reputation on campus rose several points after that!)

Santana's contribution to this set of CDs is fairly successful

Illustration: Philip Anderson

Ein Straussfest is a real blockbuster, with the robust Telarc bass drum in evidence throughout.

sonically. The mix is well balanced, but the pickup of individual instruments lacks some clarity and focus. The bass especially seems mushy. Most of the exotic percussion instruments are nearly inaudible, except during a passage (about two minutes into the track) that specifically features them. Mike Shrieve's drum solo really cooks with excitement, and Carlos Santana's second solo wails and soars, but without the polish he would later acquire. Who would have guessed what he and John McLaughlin might do many years later? The seeds are here, though.

Influenced by 18 hours a day of powerful musical experiences, the crowd spontaneously improvised its own music. To me, this is the most significant expression of Woodstock, because it represents the sense of community and "power to the people" that Woodstock brought into focus. Some people sang little rhythmic/melodic fragments, continuously repeating and altering them. Others picked up bottles and cans, turning them into percussion instruments. The musical techniques they used are not too different from what the minimalist composers are doing today. The wonderful thing is that these crowd chants arose spontaneously, in true '60s fashion. The people who recorded the festival deserve praise for being aware enough to get this on tape.

Mobile Fidelity's disc package is acceptable, but suffers from the problems that plague CD album design in general. The original LP made a very strong statement about Woodstock, the event: A triple-fold album cover conveyed a sense of the crowd's size, with a large panoramic photo, taken from the back of the stage, showing the enormous audience ("the largest group of people ever assembled in one place," according to Max Yasgur). Mobile Fidelity should have reproduced more graphics from both LP albums, just to remind us of the size of the event.

However, Mobile Fidelity has reprinted the original souvenir program, and you can order it from them (using a card enclosed in the CD package) for a nominal $4 shipping and handling fee. Ideally, it should be included with the discs, but that would present some distribution and display problems.

This is the first CD set to appear on the market with Sanyo's special acrylic coating on the *data* side as well as the label side. Its purpose is to protect the surface from scratches and warpage. This factor is not especially important to most users at home, but the unfriendly environment (heat, dust, careless handling) of a car will make such treatment more important as car CD players become more common.

One very annoying flaw is that the lists of tracks, titles, and performers printed in the booklet and on the disc labels do not correspond with what actually is on the disc. This makes finding a particular selection a nuisance rather than a pleasure. Obviously, in a project this large and complex, nailing down all those details is not a very easy task, but this set has too many of these errors to overlook.

This potpourri of works by the Strauss family does indeed have sections that could raise havoc if caution is not observed. The first number, "Explosion Polka," is true to its name; it begins with a room-rattling bang! The next selection, "Champagne Polka," features the actual popping of champagne corks. (Two cases of California champagne were opened for this sound effect.) "Banditen Galop," the third number, has the ultra-high-energy transients of actual pistol shots, and cut seven, the "Fire Festival Polka," features metallic anvil pounding. Cut eight, "At the Hunt Polka," blasts you with rifle shots, and number 10, "Clear Track Polka," has several startling, high-level train whistles. The finale, "Thunder and Lightning Polka," includes among its sonic effects a speaker-blowing thunderclap!

Erich Kunzel

Woodstock is thoroughly enjoyable on many levels. It is a document of an important musical/sociological occasion. It also is a concentrated compendium of musical styles of the '60s.

Steve Birchall

Ein Straussfest. The Cincinnati Pops Orchestra, Erich Kunzel.
Telarc CD-80098.

Here is another blockbuster demonstration CD recording from Telarc, replete with label warnings about the imminent destruction of your audio system if you play it at high volume.

The musical values are not subverted by the special effects. Erich Kunzel gives fine performances of the lilting Strauss melodies and really spirited renditions of the more athletic works. The sound is beautifully clean, up to Telarc's usual standard. As always, the balance their engineers maintain between orchestral definition and hall ambience is most realistic. Throughout the works, the robust Telarc bass drum is much in evidence.

If you want a Compact Disc that will give you great music, great sound and great fun, this *Straussfest* recording is it!

Bert Whyte

On *Trumpets No End*, the superb interaction between the music and the recording adds an extra measure of enjoyment.

Trumpets No End: Bobby Shew, Chuck Findley.
Delos D/CD 4003.

Put this disc in your CD player, and the room instantly fills with smoke, the lights dim, and the waiter brings another round of drinks. The superb interaction between the music and the recording sets the psychological stage perfectly, adding an extra measure of enjoyment to a beautiful recording.

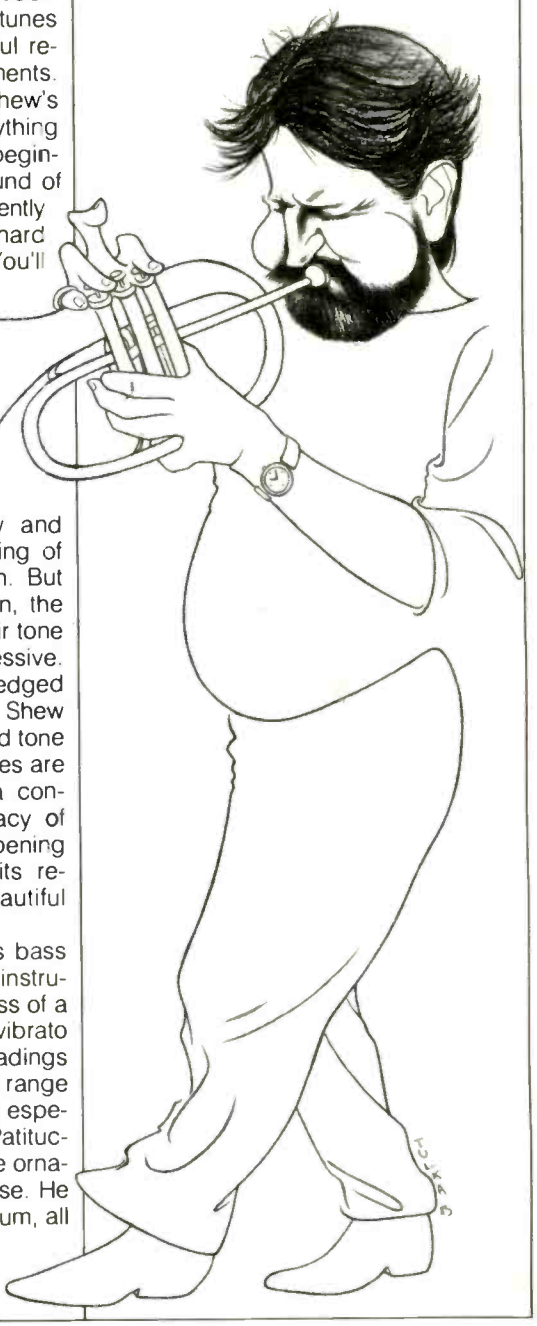
Musically, this is mellow, laid-back, West Coast jazz, played with consummate attention to detail. Despite all the brass, the style nearly always is subdued, relying on subtleties of phrasing, tone, and harmonic color to make its effect. Tempos generally are moderately slow, making the uptempo tunes more noticeable. Even so, tasteful restraint is the approach to all elements.

The second track, Bobby Shew's "Nadalin," is a distillation of everything good in this recording. At the beginning, the distinctive sound of a suspended cymbal, gently struck on the cup with hard sticks, is crystal clear. You'll even be able to hear the changes in color as Sherman Ferguson moves around on the cymbal, drawing out many subtleties in just a few seconds. John Eargle's skillful engineering helped to capture all of these sounds.

When the trumpets of Shew and Chuck Findley enter, the blending of their tones is beautifully smooth. But when each takes a solo later on, the small personal differences in their tone and style become quite expressive. Findley uses a slightly harder edged tone and tonguing style, while Shew plays with a slightly more rounded tone and softer attacks. The differences are slight—just enough to create a contrast. The blending and accuracy of intonation they give to the opening statement of the melody and its restatement make for really beautiful sounds.

Listen also to John Patitucci's bass solo in "Nadalin." He makes his instrument sing with the expressiveness of a human voice. His variations in vibrato depth and speed, dynamic shadings within a phrase, and a surprising range of tonal qualities make this solo especially memorable. Sometimes Patitucci's pitch-bending resembles the ornamentation a sitar player might use. He has many other solos on the album, all of them excellent.

In the third track, "Stompin' at the Savoy," Shew plays his double-belled trumpet (called, of course, a "Shew-horn"). One bell is muted, the other is open, enabling him to trade phrases with himself by opening and closing an extra valve. Rarely have I heard such an authentic muted trumpet sound on disc. The complexity of that sound, with its suppressed fundamental and new resonant peaks in the upper partials, is a delight.



Illustrations: Rick Tulka

The recording, made at Annex Studios in Hollywood, has an excellent sense of intimacy combined with exactly the right amount of room ambience. How much of this is because of the acoustics of the room and how much comes from artificial reverb added later is difficult to say. Whatever Eargle and Ralph Jungheim did to achieve this quality, it sounds convincingly real. To me, that's the highest kind of praise for both the engineer and the producer.

The accuracy of the tone colors is further testament to the skill of Eargle and Jungheim in using the digital medium. They avoided the glossy, surrealistic quality that pervades pop recording. Instead, they made a recording that sounds natural and live. This approach complements the efforts of the musicians beautifully. All the carefully scaled variations in timbre are just as easy to hear as if this were a live performance.

Two other recordings by Eargle and Jungheim were released by Delos at the same time as *Trumpets No End*. Mavis Rivers' *It's a Good Day* and Joe Williams' *Nothin' but the Blues* are equally well-recorded and enjoyable CDs. *Steve Birchall*

Rocker: Elvis Presley
RCA PCD1-5182.

Elvis
RCA PCD1-5199.

Elvis Presley would have been 50 years old on January 8, 1985. To celebrate the occasion and to get further mileage out of their catalog's deceased shining star, RCA reissued numerous past albums and juggled old, previously released material into new configurations to create the illusion of new packages. Two of these newly created albums are *Rocker* and *Elvis*. Both have received very impressive cleanup jobs.

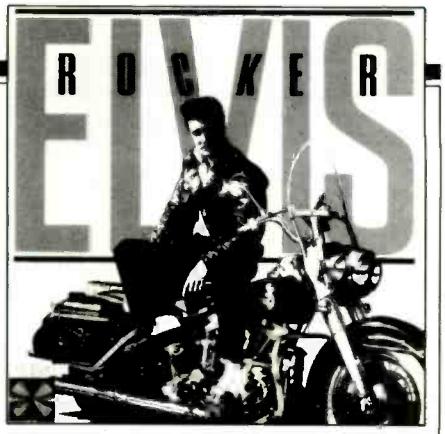
Rocker features eight classic selections recorded in 1956, and two from 1957. The original mono master tapes were digitally remastered, and the results are surprisingly clean: There is no audible tape hiss and no discernible extraneous noise whatsoever. Although the recordings themselves are primitive—dead center, single-planed, limited in presence and dynamic range—their new clarity will be a joyous discovery for Elvis fans old and new. Early gems—including "Jailhouse Rock," "Hound Dog," and "Blue Suede Shoes"—emerge out of total silence. Although Elvis' voice is consistently doctored with reverb and sometimes recorded so far back in the mix you'd think he was in Tupelo and the studio was in Memphis ("I Got a Woman," for instance), it's still great to hear his brash, youthful, sexy exuberance undistorted by the ravages of time on vinyl. Scotty Moore's masterful but too-short solo spins on guitar sound fresh and vibrant in arrangements that seem pretty dated to these '80s ears.

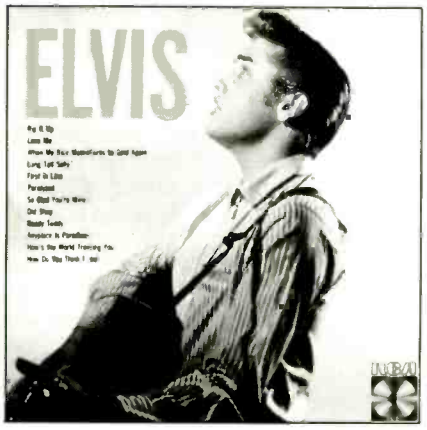
It's also great to see the unfamiliar photograph of Elvis, in a black leather jacket, looking young and tough, perched on a road-devouring Harley-Davidson on the cover of this CD.

Kudos to all involved in the technical revamping of this nearly two-decade-old material: Project engineer Rick Rowe, mastering engineer Jack Adelman, and technical supervisor Charles Kaplan. Whether you need this particular configuration of readily available Elvis classics is up to you, but they sure sound fine on this mean, clean CD.

Yet another of RCA's releases in celebration of what would have been The King's 50th year of life, *Elvis* features a mixed bag of early Presley performances, also from 1956. It contains a few of the well-known, uptempo songs of *Rocker*—"Rip It Up," "Ready Teddy," and "Long Tall Sally"—plus a selection of ballads and lesser-known rockers.

This CD has received the same tender, loving technical care as *Rocker*, although here the dedicated recording pros responsible remain uncredited on the disc's liner notes. However, these anonymous technical wizards have accomplished more than a mere swab-the-decks-and-digitalize job. They have removed the artificial-sounding, electronic reprocessing for stereo to which this material was subjected when stereo first became important in the '60s. The original, natural, mono channelling has been restored. The arrangements and original recorded sound are still '50s-primitive, but the new-found clarity in the digital format is revelatory. Only one cut, "First in Line,"





reveals tape hiss from the original source, and even this is minimal.

Unlike *Rocker*, which paints a one-dimensional picture of Elvis, perpetuating one of our stereotypical images of The King, *Elvis* presents a handful of mini-portraits, some of them alien to our distorted memories. "Old Shep," for instance, is an incredibly sappy, sentimental ballad of a man and his old canine buddy, in which Elvis tried his hand at the piano for the first time on record. "How Do You Think I Feel" has an uncharacteristic Tex-Mex texture, while "So Glad You're Mine" has a honky-tonk piano intro and a bluesy vocal. Mixed in with these, and featuring the smooth vocal backup of The Jordanaires, are the soulful ballads that had female teens of the '50s weeping and screaming in the aisles.

Much of this is one-time interesting, but ultimately not Presley masterpiece material. Once again, it's your choice of configuration for Elvis' recorded history; you can be assured that this stuff will turn up again in one package or another before RCA runs out of permutations. *Paulette Weiss*

Big Bam Boom: Daryl Hall and John Oates
RCA PCD1-5336.

Hold onto your seat when you put this high-powered CD of Daryl Hall and John Oates' *Big Bam Boom* on the box. The first distant, electronic chord that opens this disc swells up and explodes like a grenade under your butt. No buts about it, this album is accurately titled. Its brief initial cut, "Dance on Your Knees," will immediately catapult you into a state of charged excitement with its 1½ minutes of slam-bang, percussive rock 'n' roll.

Hall and Oates are a phenomenon in modern rock, the only duo of consistent, long-term popularity who just as consistently pump out high-quality, high-energy, highly listenable rock tunes. This nonstop dance-athon is one of their most solid albums in years, and as modern as a microchip. The boys from Philly have managed to save their soul while updating for the modern age with captivating electronic tricks and whooshing tape segments. Besides the '80s electronics, the duo has come up with an arsenal of popping percussive techniques from the streets, techniques that slam *Big Bam Boom* into pulsing life for its full 40½ minutes of playing time.

The original analog version of this 1984 album translates well to Compact Disc. The impact of the disc's aforementioned opening chord, for instance, is unquestionably intensified by its emergence from absolute silence. The wonderfully jerky, clean percussion on "Method of Modern Love" comes across crisp and solid. Equally clear is the sound of percussion being swallowed into silence on "Bank on Your Love," an effect that may have been achieved by running this taped segment backwards. The blessed transparency of this CD allows the multiple layers of these fast-moving arrangements to be heard without collisions of sound. "Some Things Are Better Left Unsaid," for example, is filled with shifting, layered electronics and almost subliminal vocal echoes. Without the clarity of digital recording, this cut's thrilling sense of movement across aural space as well as its nearly buried details might well have been totally lost.

Spatial presencing is exquisite; individual voices and instruments can be pinpointed in space through multi-layered aural planes and accurate left-right channel manipulation. For instance, subtle as it is, Hall's one-time utterance of "All American Girl," in the introduction to the song of the same name, is clearly discernible in the far-distant background of both left and right channels.

The dynamic range of this disc is remarkable. Hall and Oates, under the guidance of producer/mix consultant Arthur Baker, play with juxtaposing the very faintest of musical accents against some of the biggest bam booms of rock you've ever heard on record. There is no distortion apparent anywhere.

"Out of Touch" and "Method of Modern Love" rocketed the analog album to the top of the charts as 1984 flipped over into 1985. Confirmed rock fans with a penchant for clean CD sound will want this little disc exploding out of their speakers *immediately*.

Paulette Weiss

The Best of Me: David Foster
Mobile Fidelity Sound Lab MFCD 810.

Grammy award-winning producer/composer/arranger David Foster was little known to the general public until this year's televised award ceremonies. He's one of those faceless artists whose songs have become famous from the lips of highly visible performers, including Al Jarreau, Chicago and the once-ubiquitous Boz Scaggs.

This little compendium of Foster's own arrangements of his best work is a dreamy, romantic 41+ minutes of sophisticated, easy-listening music. Foster plays nearly all of the instruments on this mostly instrumental album, with the support of splendid synthesizer work which creates the illusion of massed violins, horns, and further lush orchestration. Synth programmers Steve Porcaro and Amin Bhatia, and Fairlight computer wiz Nick Camas, deserve to stand up and take a bow.

The sound is first-rate. This is another Mobile Fidelity digitalized Original Master Recording, which means the original analog master tape was cleaned up and then digitally encoded for the CD format. Texture, presence, and dynamic range are all excellent, although this recording does lack that exquisite, crystalline quality present on many lushly orchestrated productions which have been digitally encoded at the outset.

As for the music, these are simple but beautiful melodies which manage to create an aura of romantic intimacy despite their potentially overwhelming synth-orchestral presentation. This is dinner-by-candlelight music, swooning-into-each-other's-arms music. And if you can't afford to hire your own string quartet to accompany a romantic interlude the way Gary Cooper did for Audrey Hepburn in the movie *Love in the Afternoon*, this vibrant, sweet CD will do very nicely. *Paulette Weiss*

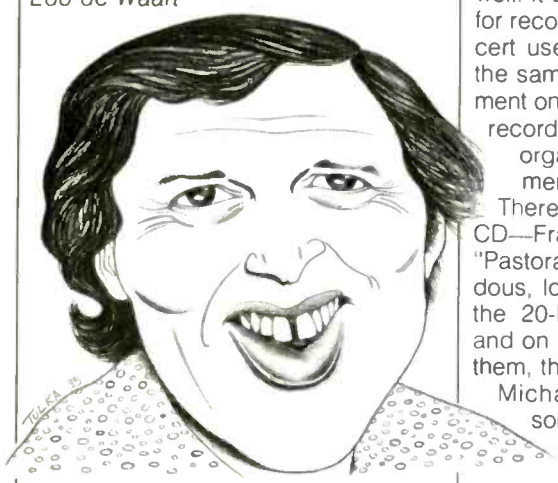
The sound of the Offenbach *Overtures* has great power and projection, making the disc a model of its kind.

Jongen: Symphonie Concertante for Organ and Orchestra; Franck: Fantaisie in A, Pastorale. The San Francisco Symphony Orchestra, Edo de Waart; Michael Murray, organ.
Telarc CD 80096.

Telarc's magnificent recording of Jongen's "Symphonie Concertante for Organ and Orchestra" is a genuine blockbuster. There aren't many works for organ and orchestra; the one that comes immediately to mind is, of course, Saint-Saëns Symphony No. 3.

The "Symphonie Concertante" was championed by the late Virgil Fox, who included his organ transcription of the Jongen piece in a program I recorded (of Virgil playing the Ruffatti organ in Garden Grove, Cal.). The new Telarc CD, however, is the first release since an ancient Capitol LP of the Belgian National Orchestra.

Edo de Waart



The "Symphonie Concertante" is a tremendously dynamic and exciting piece. Right after the first few orchestral bars, the full organ enters at very high level, and you had better have an amplifier and speakers that can cope with the enormous output. Throughout the work, there are other great, dynamic passages for organ and orchestra, along with some very lovely, melodious sections.

The recording was made in the new Davies Symphony Hall in San Francisco. As a concert hall, it has not been too kindly received. Telarc engineer Jack Renner tells me he had some problems with this hall, but from the sound he got, I'd say he managed very well. It apparently is a hall more suited for recording (empty) than it is for concert use. The organ in Davies Hall is the same type of Italian Ruffatti instrument on which Virgil Fox played when I recorded him. It is a brilliantly voiced organ having great power and tremendous, 32-foot pedals.

There are two filler pieces on this CD—Franck's "Fantaisie in A" and "Pastorale." There are some stupendous, low-pedal fundamentals around the 20-Hz region in the "Fantaisie," and on equipment that can reproduce them, they are just thrilling.

Michael Murray, who has made some outstanding recordings for Telarc, is the organist, and he brings his usual mastery to the Jongen and Franck works. Edo de Waart is good with this kind of repertoire, but evidently didn't please some people with his handling of the more standard repertoire, and he has since departed the conductorship of the San Francisco Symphony Orchestra. Jack Renner has given us a superb recording, with a splendid balance between organ and orchestra. The balance works well in the hall ambience, giving us plenty of power and good definition.

In summation, an outstanding and exciting CD that will tax the capabilities of even the finest audio system.

Bert Whyte

Neville Marriner

Offenbach: Overtures. The Philharmonia Orchestra, Neville Marriner.
Philips 411 476-2.

Here we have eight of Offenbach's most familiar overtures, in a blockbuster recording.

Neville Marriner elicits great playing from the Philharmonia Orchestra, and he lovingly polishes these orchestral gems into gleaming, burnished performances. The Offenbach music is infectious, ebullient, and brilliantly scored. One gets caught up in the excitement of "La belle Hélène," "La Périchole," and "La vie parisienne," and delights in the bombastic opening passage of "La Grande-Duchesse de Gérolstein."

The sound on this CD is simply stunning. The digital recording is very big and open, with all orchestral elements well-defined in a spacious perspective. Internal balances are such that a very cohesive sound is produced, offering great power and projection with unfettered dynamic expression. This is a multi-miked recording, but it is most impressive, a model of its kind.

Bert Whyte

Water Music of the Impressionists. Carol Rosenberger, piano.
Delos D/CD 3006.

This justly famous recording, which garnered much praise in its original LP edition, is now successfully transferred to CD.

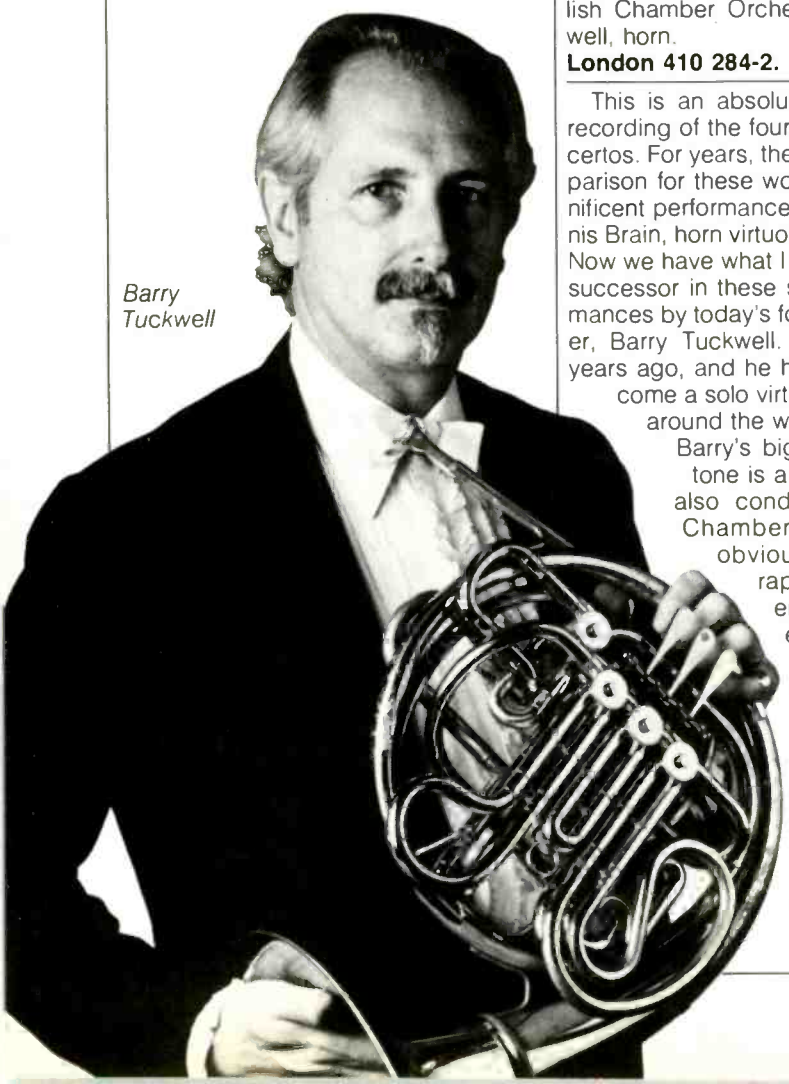
Illustration: Rick Tulka

Barry Tuckwell produces a smooth, mellow horn tone that is a joy to the ear, and he obviously has a good rapport with the rest of the musicians.

Interestingly, my old friend Stan Ricker, record-cutter par excellence, was the engineer. Stan used just a pair of B & K 4133 omnidirectional instrumentation mikes, with power supply/preamps designed by another friend and former colleague at Crystal Clear Records, John Meyer.

The piano sound is very clean, sonorous, and highly detailed in a moderately reverberant recording hall. One odd quirk is that the higher registers of the magnificent Bösendorfer Imperial Concert Grand piano display a bit more hall ambience than the middle and lower registers.

Carol Rosenberger plays brilliantly, and expertly uses the extra half-octave bass response of the Bösendorfer to emphasize the sonorous tolling of the bells present in Debussy's "Sunken Cathedral." *Bert Whyte*



Barry Tuckwell

Relaxin': Joe Beck
Digital Music Products CD-444. (Available from Digital Music Products, Rockefeller Center Station, P.O. Box 2317, New York, N.Y. 10185.)

Relaxin' is a pleasant, innocuous recording with Joe Beck on guitar, Jay Leonhart on acoustic bass, and the well-known Grady Tate on drums. This is another superbly recorded production from Tom Jung and, as usual, a good value with over 56 minutes of music.

As the title indicates, this is relaxin' music, easygoing arrangements of such favorites as "What's New?" "Secret Love," and "Georgia on My Mind." The sound is impeccably clean, and the music is just the thing to accompany cocktail chatter. *Bert Whyte*

Mozart: Concerti for Horn. The English Chamber Orchestra; Barry Tuckwell, horn.
London 410 284-2.

This is an absolutely delightful CD recording of the four Mozart horn concertos. For years, the standard of comparison for these works was the magnificent performances by the late Dennis Brain, horn virtuoso par excellence. Now we have what I consider a worthy successor in these superlative performances by today's foremost horn player, Barry Tuckwell. I recorded Barry years ago, and he has long since become a solo virtuoso, concertizing around the world.

Barry's big, smooth, mellow tone is a joy to the ear. He also conducts the English Chamber Orchestra and obviously has a good rapport with the players, who give him execution of very high order. The sound is superb—nice, clean strings are free of edginess, and Barry's horn is ideally balanced just forward of the orchestra. Wonderful music, great sound—this CD is a gem! *Bert Whyte*

Beethoven: Symphony No. 4. The Berlin Staatskapelle, Otmar Suitner.
Denon 38C37-7077.

This release is one of the best sounding to come along in some time. The notes are in Japanese, but I have been able to get a partial translation. The recording was apparently made with the new Brüel & Kjaer studio-quality, omnidirectional microphones, noted for their low self-noise level and their absolutely flat response across the frequency range.

Recording with omnis in a large, resonant hall is not without its problems, and many listeners will feel that this recording had just a little too much reverberant pickup. This is, of course, a matter of taste, and most listeners can adjust easily, especially when the recording has so much going for it otherwise.

There is not a harsh sound to be heard. The string ensemble is seamless from bottom to top, and the texture is absolutely gorgeous. There are CD critics who claim that digital processes create harshness in string sound; for them, this disc should be a revelation.

Otmar Suitner's performance is just a bit on the slow side, and I, for one, feel that Beethoven would have been better served by a somewhat smaller ensemble.

Highly recommended for its sonic values. *John M. Eargle*

Dream Street: Janet Jackson
A&M CD 4962 DIDX81.

I confess; I approached this one with an attitude on. I mean, I've *heard* La-Toya, but just because your last name is Jackson doesn't mean you're automatically a pop music genius. Well, good news, Janet's okay. She sounds a lot like Michael but with less heft to her voice and less of the incredible expressiveness he picked up during many years of public performance.

The drawbacks of being a late-blooming Jackson are many. The comparisons are inevitable; critics are bound to point out that you're getting attention based on someone else's hard work and success.

One of the huge compensatory advantages, however, is the ability to hire the best in the business to assist you,

Though Janet Jackson does not have an outstanding voice, she handles herself with real sophistication on *Dream Street.*

including members of your own illustrious family. Yep, Michael makes an appearance on this one, but you'll have a hard time hearing him in the mix. He, Tito, Jackie, and Dino Espinosa share backup vocals on "You Don't Stand Another Chance," the hot, funky opening number. Big brother Marlon produced this cut with associate producer John Barnes, and is it ever a winner! The production is sophisticated, with a big, fat drum intro out of clean silence, followed by a funky bass line that enters the phantom center over a background of light, dancing synthesizer accents. Unfortunately, the production is so overwhelming on this one that Janet's vocal, at center midground, isn't completely the star of the song.

Janet makes it to the upfront center spot on the following cut, however, sharing the vocal spotlight with Cliff Richard on "Two to the Power of Love." Perhaps it's Richard's influence, but here she sounds less like a female Michael and more like—dare I say it?—Olivia Newton-John. Anyhow, the synth work sparkles, the tune is quite pretty, and there's a real sense of open aural space. This one is produced by one of the slickest producing teams in the biz, Giorgio Moroder and Pete Bellotte. They lay claim to five cuts on this CD, including "Communication," replete with electronic communications sound effects, and the title tune, with its stereotypical lyrics about a poor girl's struggle to make it in Hollywood. The percussion work on "Dream Street" makes up for its banal lyrics; in fact, the percussion and synth work are outstanding throughout this CD.

Marlon is responsible for producing one other cut, "All My Love to You," which features a brief moment of total silence, a razor-sharp second of empty space cutting through multiple layers of music. Jesse Johnson produced two cuts, "Pretty Boy" (which borrows from Prince but lacks the juice) and "Fast Girls" (a fairly ordinary funk exercise).

This CD has outstanding dynamic range, an excellent sense of spatial presence, and flawless clarity. It is a fairly eclectic collection of songs, and though Janet doesn't have an outstanding voice, she handles herself with some real sophistication. Great production, great arrangements, great sound. *Paulette Weiss*

Mozart: Concertos Nos. 15 and 16. The English Chamber Orchestra, Murray Perahia.
CBS Masterworks MK 37824.

This is an excellent CD of these ingratiating, early Mozart piano concertos. Murray Perahia is the pianist, and his performance is exemplary, both as musician and conductor. He takes a properly light-handed approach to these works, and they are sprightly readings, embellished by his impeccable technique.

The sound is superb; surely this is one of the best sounding CDs I've heard from CBS Records. It is very clean, with precise, accurate transient attack on the piano. The string sound is blessedly free of edginess. The piano is balanced nicely, just forward of the orchestra, and the acoustic perspective affords a pleasing spaciousness along with finely etched detail. A delightful, tuneful recording in every respect.

Bert Whyte

Saint-Saëns: Symphony No. 3, "Organ." The Baltimore Symphony Orchestra, Sergiu Comissiona; Frederick Minger, organ.
Vanguard K38Y-17.

This popular work is now available on Compact Disc in at least three different recordings.

The Vanguard recording was engineered by two friends of mine, John Newton and Jeff Zoraya, and by no less than two other engineers. I personally do not endorse this practice of engineering by committee. When I record, I fly solo—or I don't record at all. Perhaps this multiple engineering is responsible for the not-altogether satisfactory sound. I have been in the National Presbyterian Church in Washington, D.C., where this piece was recorded. It is not an easy venue, but it has a big Aeolian-Skinner organ, and I can't understand why the organ part of this symphony is as attenuated as it is. I know Newton and Zoraya know how to properly record an organ.

Janet Jackson

Carol Rosenberger is a formidable talent, and her performance of these Beethoven piano sonatas is powerful and intense.


Carol Rosenberger

Anyway, conductor Comissiona and the Baltimore Symphony furnish a spirited and well-paced performance, with an especially rousing finale. But this is where the organ should make a grandiose sound, and such is not the case. Too bad! *Bert Whyte*

Beethoven: Sonata No. 23 in F Minor for Piano, Op. 57 ("Appassionata"), Sonata No. 32 in C for Piano, Op. 111. Carol Rosenberger, piano.
Delos D/CD 3009.

This Delos recording of two of Beethoven's most popular piano sonatas was engineered by my old friend and master record-cutter, Stan Ricker.

Knowing that pianist Carol Rosenberger would be playing a Bösendorfer Imperial Concert Grand with its extra half-octave of bass (response down to 16 Hz!), Stan opted to use Brüel & Kjaer 4134 mikes, and special, low-noise preamps built by John Meyer. Stan fed just a stereo pair of the mikes into a Studer 169 console, and thence to the Soundstream digital recorder. Among the reasons for using these B & K mikes is their ultralow frequency response—almost flat at 2 Hz—and their ability to accept SPL of up to 160 dB!

I warn you, the piano transients on this CD are tremendous. To play the crushing, triple-fortissimo bass and midrange chords on this recording requires a brute speaker system and amplifier. My new B & W monitors driven by Krell KMA-200 (200-watt) Class-A amplifiers were equal to the task, and the sonority of the sound was simply awesome.

Stan has recorded the piano relatively close-up, but the nice, warm ambience of the hall he used affords a very natural piano sound. Carol Rosenberger is a formidable talent, and her performances of these works are powerful and intense, with lots of drama and expressiveness, yet with due regard for the lyrical qualities of these great Beethoven piano sonatas.

A splendid large-scale recording, meant to be played on a large-scale audio system. *Bert Whyte*

Debussy: La Mer; Nocturnes. The Philharmonia Orchestra, Michael Tilson Thomas.
CBS Masterworks MK 37832.

Michael Tilson Thomas turns in a really splendid performance of "La Mer," aided and abetted by some of the best sound I've ever heard from a CBS CD. Admittedly, this is the Philharmonia Orchestra, recorded in London with, once again, an EMI balance engineer at the console. It matters little—Thomas paints a very evocative picture of the sea, and his storm is almost of hurricane intensity. Oddly, his performance of "Nocturnes" is less persuasive, and one could also say that the sound quality is not as good as on "La Mer." In "La Mer" we have nice, clean, high strings. Even though we must presume that "Nocturnes" was recorded at the same session, here the high strings are edgy.

"La Mer" is really a sonic tour de force. The dynamic range is exceptionally wide and, on B & W 808 speakers, the sound has extraordinary impact. *Bert Whyte*


Varujan Kojian

Liszt: Symphony No. 2, "Dante." The Utah Symphony Orchestra, Varujan Kojian.
Varèse Sarabande Digital VCD-47207.

On this CD, the rarely performed "Dante Symphony" of Liszt is conducted by Varujan Kojian. His Utah Symphony Orchestra was recorded in the splendid acoustics of their new hall.

Bruce Leek, the engineer who did such a fine job on the *Star Wars* trilogy of Compact Discs, was also the engineer for this recording. Apparently, he used approximately the same mike setup as in the trilogy. While the sound is generally quite good, for some reason (possibly the scoring) it just doesn't have the exemplary qualities he achieved in the *Star Wars* recording. I had a feeling that the sound was a little compressed in places, and some internal balances just weren't right. Perhaps it is my reaction to the music. This is Liszt at his most fustian—probably the reason for this symphony's infrequent performance. *Bert Whyte*

Ravel, Chausson: Piano Trios. Beaux Arts Trio.
Philips 411 141-2.

Pianist Menahem Pressler, violinist Isidore Cohen, and cellist Bernard Greenhouse are the superb musicians who make up the famous Beaux Arts Trio.

This trio has been concertizing together for many years. In this digital recording of the Ravel and Chausson piano trios, their rapport is evident in the finely wrought performances. Their playing is elegant, refined, yet highly musical and expressive. The Philips


Beaux Arts Trio

The Beaux Arts Trio's rapport is evident in this finely-wrought recording of the Ravel and Chausson piano trios.

engineers have given the trio an outstanding recording. The perspective is moderately close-up in a nice, warm (but not overly reverberant) ambience. Balances among piano, violin, and cello are near ideal. All is very clean and highly detailed, and the Beaux Arts Trio makes a ravishingly beautiful sound. The dynamic compass of the piano is tremendous; you'll need gobs of power to realistically reproduce its massive sonorities. This CD must be regarded as one of the best chamber music recordings I've heard in some time. *Bert Whyte*

Time Warp. The Cincinnati Pops Orchestra, Erich Kunzel.
Telarc CD-80106.

If ever there was a sonic blockbuster, this CD is it! Which is exactly the intention Telarc had when recording this collection of space movie music. Their purpose was to explore the outer reaches of dynamic range and create some special sonic effects of crushing sonority. Producer Bob Woods has stated that *Time Warp* has the "hottest levels" since their memorable "1812 Overture" recording!

Synthesizer artist Don Dorsey composed a special work, "Ascent," to open the recording, and it quite literally opens with a bang. (If your initial volume setting is too high, you may be sorry!) This segues into the ubiquitous introduction to "Also sprach Zarathustra." Then it is on to excerpts from *Star Trek*, *Battlestar Galactica*, *Superman*, *Star Wars*, and *Alien*. Next are "Blue Danube" and the "Gayne" adagio from *2001: A Space Odyssey*, then, another blast of "Zarathustra."

There are great brass fanfares here and brilliant cymbal clashes and huge fortissimo bass drum whumps of awesome impact. The *Battlestar Galactica* sequence opens with a crushing orchestral chord with tremendous bass drum strokes. When some people visited, I had cued the CD to this passage, setting the gain controls for a very hefty level. When I started the CD, the blast of sound damn near made my friends jump out of their skin! All of this sonic furor is utterly clean, and while the music isn't of great moment, it is exciting and great fun. *Bert Whyte*

Bartók: Music for Strings, Percussion and Celesta. The Tokyo Metropolitan Symphony Orchestra, Moshe Atzmon.
Denon 38C37-7122.

Bartók's angular writing is very apparent in his famous "Music for Strings, Percussion and Celesta," and less so in his "Roumanian Folk Dances." These two works are given a good, if not particularly exciting, performance by Moshe Atzmon conducting the Tokyo Metropolitan Symphony Orchestra.

The pieces were recorded using 11 Schoeps, four Shure and four AKG mikes in the acoustically attractive Narashino Bunka Hall. There is some spotlighting of instruments, but this is a well-balanced, very clean sound. Strings are fairly smooth, and the transient response on the percussion instruments is sharp and accurate. The recording is good enough to warrant more Bartók CDs from Denon.

Bert Whyte

Mahler: Das Lied von der Erde. The Berlin Philharmonic, Carlo Maria Giulini; Brigitte Fassbaender, contralto; Francisco Araiza, tenor.
Deutsche Grammophon 413 459-2 GH.

This DG recording of Mahler's *Das Lied von der Erde* (Song of the Earth) has a number of flaws, but, in general, is so good that it overcomes the deficiencies.

In the first song, "Das Trinklied," tenor Araiza seems too submerged in the orchestral sound. At the same time, his voice and the high strings sound both shrill and compressed. Oddly, after this problem-ridden opening, the sound blossoms, becoming more open and transparent, with Fassbaender making some lovely sounds. Her performance of "Der Abschied" (The Farewell) is simply beautiful and very heartfelt. The music accompanying her in this movement has wonderful sonic presence, is highly detailed, and has some supercharged sonorities. Giulini's conducting is masterful, and if you are not moved by the other-worldly beauty of this music, there is no hope for you. *Bert Whyte*


Carlo Maria Giulini


Brigitte Fassbaender


Francisco Araiza


Scarborough Chamber Players

This CD of rarely heard works, performed by the Scarborough Chamber Players, is a real delight.

Works of Spohr, Villa-Lobos, Starer, Roussel, and Blank. The Scarborough Chamber Players.
Centaur CRC 2016. (Available from Centaur Records, P.O. Box 23764, Baton Rouge, La. 70893.)

This CD is a real delight, presenting an interesting collection of rarely heard works for soprano with chamber resources as simple as piano, flute, bassoon and clarinet. Selections include Spohr's "Six German Songs," Villa-Lobos' "Bachianas Brasilieras No. 6," Starer's "Songs of Youth and Age," Roussel's "Two Poems of Ronsard," and Blank's "Four Poems on Texts by Emily Dickinson."

Performances are excellent, and the recording approach is simple and direct. Texts are included in the notes.

John M. Eargle

Berlioz: Symphonie Fantastique. The Tokyo Metropolitan Symphony Orchestra, Jean Fouret.
Denon 38C37-7087.

This CD version of Berlioz's *Symphonie Fantastique*, with a minor league ensemble, The Tokyo Metropolitan Symphony Orchestra, conducted by the relatively obscure Jean Fouret, faces very tough competition from several other Compact Discs of this work, most especially from Telarc's superb recording by Lorin Maazel with the Cleveland Orchestra.

The playing of the Tokyo Metropolitan Symphony Orchestra is fairly good—nice ensemble work in the strings, and fine brass playing too. The dialog between the English Horn and oboe in the beginning of the third movement, "Scene in the Country," is particularly well done. Fouret gives a fairly straightforward performance, but it lacks momentum and drags a bit. He is slower than Maazel in the "March to the Gallows" and the "Witches' Sabbath," and doesn't generate as much excitement. Fouret conducts the work in 50 minutes flat, to Maazel's 48:34.

Sonic values are variable. The acoustics of the Sayama-shi Public Hall in Tokyo, where the work was recorded, are really good—warm, spacious, with a decay time around 1.9 to 2.2 seconds. Multi-miking was used, and while the sound is highly detailed, this technique negates some of the advantages of the fine acoustics. Up to mezzoforte level, first and second violins have a nice clean sound; above that level, they get quite shrill. There is a huge bass drum, very solid in impact, which I'm afraid is used a bit too enthusiastically in the last two movements. Dynamic range is quite wide and there are some other good points—but it falls short on both musical and sonic values as compared to the Telarc recording.

Bert Whyte

Mahler: Symphony No. 4. The Chicago Symphony Orchestra, James Levine; Judith Blegen, soprano.
RCA RCD1-0895.

As a confirmed Mahler junkie, I eagerly look forward to all Mahler recordings that appear on CD.

This glorious Fourth Symphony has much going for it, not the least of which is the great playing of the mighty Chicago Symphony Orchestra. Such stunning execution, coupled with such rich tonal resources! Levine's performance is quite good, if a bit mannered at times. However, he gives an exceptionally expressive and emotionally wrenching performance of the great third movement, "Ruhevoll."

The recording, dating from 1975, was made in Medinah Temple in Chicago. The engineer was Paul Goodman, a former colleague of mine at RCA Records. I can assure you that Paul is a fine, perceptive recording engineer. However, he is subject to the ideas and directions of producers—which in this recording means multi-miking with a vengeance. I'm fairly certain a 16-channel recorder (analog in those days, of course) was used.

Paul establishes a nice overall balance in the reverberant acoustics of Medinah Temple, and the sound certainly is clean, with lots of impact and sonority. Alas, throughout the recording, Paul's good sound is marred by ridiculous spotlighting that grotesquely bloats individual instruments, making them acoustically bigger than the whole orchestra. About a third of the way through the first movement, there is an entrance for solo first violin (the concertmaster) that is ludicrous—so spotlighted and so close-up it swamps the rest of the orchestra! The multi-miking allows the producers to dot every "i" and cross every "t" in the score, but it carries with it the perils of exaggerated perspective and a diminution of depth. Too bad! It is a shame Paul Goodman's basically nice sound must be so subverted.

Bert Whyte


James Levine

Elgar Overtures: In the South; Froissart; Cockaigne. Handel: Overture in D Minor. The Scottish National Orchestra, Sir Alexander Gibson.
Chandos CHAN 8309.

In this welcome release, Sir Alexander leads his orchestra through fine and characteristic readings of these delightful works of Elgar. The production team has opted for sound rich in room ambience and with just a modicum of spot miking. Generally the sound is excellent, but you may want to roll off the treble just a bit. The bottom end can be awesome. In "Cockaigne," the performance includes the

Kiri Te Kanawa's voice, and the expressiveness with which she uses it, are remarkable on this really lovely CD of Canteloube and Villa-Lobos.

optional pipe organ part in the final measures. The 32-foot open diapason is quite in evidence, and there are some fundamentals which reach down into the 27-Hz range. If you have a subwoofer, you'll be delighted with all of this. *John M. Eargle*

Handel: Water Music. La Grande Écurie & la Chambre du Roy, Jean-Claude Malgoire.
CBS Masterworks MK 39066.

Here is another Baroque ensemble, La Grande Écurie & la Chambre du Roy, with a recording devoted entirely to Handel's *Water Music*.

This French group was recorded in Notre Dame in Paris. The liner notes state that a Sony digital recorder was used and that the mikes were Schoeps. Original instruments of the period are used, and while some of them sound quite smooth and natural, others have a surprising edginess and harshness, not necessarily attributable to the imagined sins of digital recording. The French horns are particularly annoying. Instead of the noble, mellow tone with which we are all familiar, these horns sound hoarse and guttural, with a blatty quality. The reverb period of the church must be about 3 S, so the mikes used probably had cardioid patterns. There is plenty of air around the instruments, but the sound still has too much brilliance and fatigues the listener's ear. *Bert Whyte*

Canteloube: Chants D'Auvergne, Vol. 2; Villa-Lobos: Bachianas Brasileiras No. 5. The English Chamber Orchestra, Jeffrey Tate; Kiri Te Kanawa, soprano.
London 411 730-2.

Some time ago, I reviewed, most favorably, a CBS CD of Canteloube's "Chants D'Auvergne" sung by Frederica von Stade. Now we have this new version on London, featuring the luscious, lovely voice of Dame Kiri Te Kanawa. Dame Kiri's voice and the expressiveness with which she uses it are altogether remarkable. Her voice is clear, clean, and limpid, a refulgent example of the magnificent sounds that can be produced by a great singer. Dame Kiri's performance of these lovely works is richly expressive,

Kiri Te Kanawa

lighter textured than Frederica von Stade's. Her French diction is better and the words more articulate.

This CD was splendidly engineered by John Dunkerley. Dame Kiri's voice is projected in front of the orchestra, but not too prominently. The orchestral accompaniment is exceptionally clean and well-balanced in a moderately spacious acoustic environment. (The jacket booklet doesn't say, but I presume the recording venue was Kingsway Hall in London.)

An attractive filler on this Compact Disc is Villa-Lobos' "Bachianas Brasileiras No. 5," a composition for soprano and cello, with well-known cellist Lynn Harrell furnishing a smoothly played, tuneful accompaniment.

If you are an aficionado of "Chants D'Auvergne," you'll probably want to own both this and the von Stade CD. Faced with a choice, I'd opt for this really lovely recording. *Bert Whyte*

Popular Masterworks of the Baroque: Tafelmusik
Reference Recordings RR-13 CD.

Tafelmusik is a Canadian Baroque orchestra which uses, as often as possible, original-period instruments. For example, musical director Jean Lamon's violin dates from 1610!

This was originally an analog recording made with the special, focused-gap magnetic tape recorder of the redoubtable Keith Johnson. It was recorded for Tam Henderson's Reference Recording label, and was very highly regarded on the original vinyl LP release. The CD transfer has been very well done, and while a moderate amount of tape hiss is evident (as in the LP), at least there is no impulse or surface noise to contend with.

The program offers Handel excerpts, including parts of "Water Music," the lovely Pachelbel canon and gigue with richly sonorous cello, J. S. Bach's "Air" from his orchestral suite No. 3, some Vivaldi and Telemann, and Henry Purcell's big, noble theme which was used by Benjamin Britten in his famous "Young Person's Guide to the Orchestra."

The sound is just lovely—some of the most musical and natural strings on record, with equally mellifluous oboe and bassoon. All of this is presented in a very warm acoustic ambience, with good stage width, exceptional depth, and precise and stable image localization. The sonics are very wide-range and smooth yet afford good, clean definition on all instruments. This is a very fine reference recording for string-tone quality. *Bert Whyte*

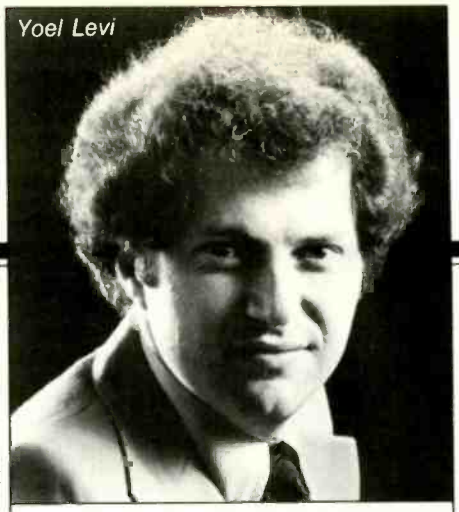
J. S. Bach: Toccata and Fugue. The historic organ of Saint-Maxim-en-Provence, Pierre Bardon.
disques Pierre Verany PV 710811.

This is another in the series of historic-organ recordings issued by a French label, Pierre Verany.

The organ is the centuries-old instrument in Saint-Maxim-en-Provence. The liner notes give an amusing account of the problems encountered in recording such an organ. It is stated rather blithely that after more than two centuries "the organ is a bit tired." The keys must be depressed with considerable force; sometimes they stick and must be pulled up. The stops are difficult to draw and return—valves stick open, the wind chests leak. The organ sounds best at night in the winter; accordingly, this recording was made with the unheated interior of the church freezing cold!

The reverb period of this old church is about 3.5 to 3.75 S, and the organist, Pierre Bardon, had to adjust his tem-

Yoel Levi has a lot going for him, including the talents of the great Cleveland Orchestra, which has performed Sibelius many times.


Yoel Levi

pos accordingly. The sound is clean enough and well balanced against the acoustics, but it is very bright and can be too aggressive, with little extra pedal foundation. The program, some of J. S. Bach's most popular organ works, is well played considering the difficulties of execution. Certainly this is not the type of organ recording for sound buffs, but it is of interest to those who collect the sounds of historic organs.

Bert Whyte

Sibelius: Symphony No. 2, Finlandia. The Cleveland Orchestra, Yoel Levi.
Telarc CD-80095.

The Sibelius Second Symphony is deservedly one of the most popular works in all of the symphonic literature. There is hardly a name conductor who hasn't recorded this work, so it might seem that a relative newcomer like Yoel Levi wouldn't have much of a chance to distinguish himself.

Nonetheless, Levi has a lot going for him. First is his innate talent, which he displayed so vividly in his exciting Telarc recording of Prokofiev's "Romeo and Juliet." Second, he is at the helm of the great Cleveland Orchestra, which has performed the Sibelius Second Symphony many, many times under the batons of such great conductors as Artur Rodzinski, George Szell and Lorin Maazel. Finally, and of great importance, is that Levi has the benefits of superb Telarc recording.

Jack Renner used Masonic Auditorium in Cleveland, a hall he knows intimately, for this recording. Employing his usual spaced-array of omnidirectional Schoeps microphones, Jack has achieved both the massive weight and sonority required for this work, as well as the highly detailed inner balances. A good example is the completely articulate and tonally accurate pizzicato strings in the opening bars of the second movement. The overall sound is very clean, with great presence, and is superbly balanced with the warm acoustics of the hall. The triumphant finale, with its massive brass fanfares, is a blaze of orchestral color. Dynamic range is very wide on this Compact Disc, and if you have the right equipment, the triple fortissimos will stun you with their power.

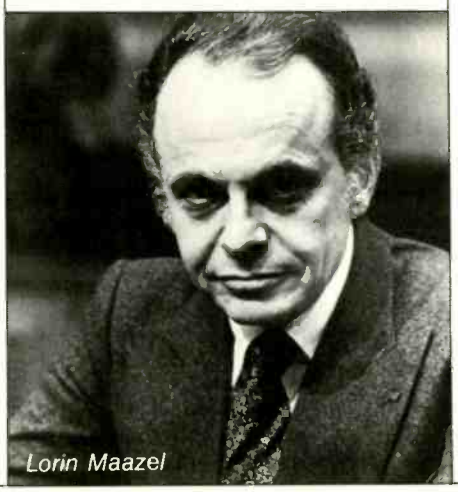
Levi turns in a performance that is certainly the equal of, and better than, some of his contemporaries. Tempos are a shade on the fast side, but he makes it work. His "Finlandia," the filler on this CD, is equally stirring and exciting. Great music, great sound—this is what a good CD is all about.

Bert Whyte

Berlioz: Symphonie Fantastique. The Cleveland Orchestra, Lorin Maazel.
Telarc CD-80076.

Herewith, a recording that is a tour de force for overall balances, inner detail, acoustic perspective, and wide dynamic range.

The *Symphonie Fantastique* has always been a favorite vehicle to show off recording skills, and Telarc has gone to extreme lengths to impress us. For example, the bells, which contribute so highly to the orgiastic "Witches' Sabbath" final movement, are usually produced by tubular "orchestral bells" which are part of the normal percussion battery. Telarc ran remote lines from Severance Hall, the main recording locale, to McGaffin Carillon, a quarter of a mile away. The principal percussionist of the Cleveland Orchestra situated himself in the carillon tower and activated two large, separately miked bells on cue. Thus, the bells were recorded in real time with the rest of the music. In the recording, there is no doubt as to the authenticity of their clangor!


Lorin Maazel

While the "March to the Gallows" and the "Witches' Sabbath" are mighty impressive in the sheer weight and tremendous impact of their sound, I am even more impressed by the sound and the expressive playing of the first, second and especially the third ("Scene in the Country") movements. Here the Cleveland Orchestra gives us playing of exquisite refinement and élan.

Some people have stated that they feel Lorin Maazel's performance of this work is dull. I would not say this is the most inspired reading I have ever heard, but dull it most certainly is not. In any case, between the superlative sound and the ravishing playing, this version makes a very strong statement for itself.

Bert Whyte

William Walton: Symphony No. 1. The Scottish National Orchestra, Sir Alexander Gibson.
Chandos CHAN 8313.

William Walton's monumental symphony from the '30s has rarely made it successfully onto disc. Outside of Walton's own monophonic version with the Philharmonia Orchestra on EMI, the only other really successful version is Previn's now-deleted mid-'60s performance with the London Symphony Orchestra on RCA.

There are two problems. First, the work is fiendishly difficult and requires more rehearsal time than most recording companies are willing to allow. Second, pacing is very critical. The fast sections must maintain their drive; otherwise, no momentum is generated. There is also a tendency, as in the case of this recording, to take the slow movement a little faster than it should be taken.

While not the first-rate recording that I am looking for on CD, the present version will more than adequately serve to introduce this powerful work to those who do not know it.

The recorded sound is excellent and the playing serviceable.

John M. Eargle

Don't let the fuzz-tone quality of these numbers fool you into thinking that *Eliminator* suffers from poor recording technique. That's ZZ Top's style.

Eliminator: ZZ Top
Warner Bros. 9 23774-2.

God-fearin' mamas send their daughters down to the storm cellar and nail the door shut when ZZ Top roars into town in their trademark, fiery-red roadster. This time, ZZ's mode of transportation is a red-hot Compact Disc of their smash 1983 album, *Eliminator*. These three hard-rockin', good-timin', bad-talkin' Texas boys—Billy Gibbons on lead guitar, Dusty Hill on bass, and Frank Beard (the beardless one) on drums—slam their way through 11 cuts of power-driven guitar boogie and leave behind nothing but a big cloud of dirt-road dust.

Four of these cuts have been made notorious by memorable videos employing ZZ's highly recognizable symbols. "TV Dinners" and the so-called ZZ Trilogy—"Gimme All Your Lovin'," "Sharp-Dressed Man," and "Legs"—all feature ZZ's lightning-bolt-shaped silver key chain; the Trilogy further features a trio of breathtakingly beautiful women with long, gorgeous gams who show up in ZZ's red roadster and generally shake up local life while the band members beam their approval and tear into their instruments. The audios are as memorable as the videos.

Don't let the ear-filling, electronic, fuzz-tone quality of these numbers on the *Eliminator* CD fool you into thinking this is a poor recording or bad production job; that's just ZZ's style. The power trio tends to spread guitar notes into aural space like a leaking tanker spreads oil on quiet waters; nothing in its path is left untouched. From the moment the drum kicks in out of CD silence on the opening cut ("Gimme All Your Lovin' ") and Billy Gibbons' guitar begins to wail, there isn't a millisecond of quiet space until the song fades to an end almost 4 minutes later. The production on this one, as on several other cuts on the disc, is pretty straightforward, with instruments massed in the phantom center channel and considerable loss of spatial presencing due to the blurring effect of the fuzz-tone electronics.

Lest you don't believe me and question the competence of producer Bill Ham or recording engineers Terry Manning and Bob Ludwig at this point, just direct your laser beam two cuts ahead to "Sharp-Dressed Man" or six cuts forward to "Thug." On the former, the fuzz-tone guitar cloud fills all channels in the opening moments until it is cleanly pierced by a breathy vocal "ahh" and a crisp, basso-profundo "yeah" in the center foreground. The drums have a solid, big-bottomed presence on this cut, and at one point they are cleanly lifted from the center channel and placed briefly on the left, then on the right for a superb one-time accent. "Thug" shows off a sophisticated hand in the production booth with its extraordinary special effects. The sound of a strange electronic insect soars crazily from channel to channel, increasing in volume until it seems to fly directly into the listener's brain. A wonderful, liquid, garbage-can percussion effect is split between right and left channels. There is absolutely no electronic fuzziness here, and the vocals hang cleanly in the phantom center. Although the skimpy liner notes credit no synthesizers, I find it hard to believe that these extraordinary effects were pumped out of mere electric guitars. If so, Gibbons is even more of a genius than Jimi Hendrix claimed he was over a decade ago.

Another highlight is Gibbons' guitar in a slow, sultry burn on "I Need You Tonight." This extended, bluesy cut, the longest on the disc at over 6 minutes, is not typical of the rest of the album, which chugs along at the more

Illustration: Rick Tulka

Transformer is a flawed but fascinating CD, a must for anyone interested in the early works of the influential Lou Reed.

usual breakneck pace set by Frank Beard's nonstop drum kit.

A couple of dead-stop endings (on "Bad Girl" and "TV Dinners") show off this CD's remarkable quietness as well as the high quality of the original recording that was translated to the digital medium. *Eliminator* was made to be cranked up to the max, and this little CD will allow you to take the volume as far as your system can go. So rev up that motor and let ZZ roar right out of your living-room speakers. Soon girls will be clawing their way out of storm cellars all over town, and you'll be having yourself one hell of a high-powered party. *Paulette Weiss*

Transformer: Lou Reed
RCA PCD 14807.

Lou Reed's flat, monotone vocals are brought intimately close to the ear on this clean Compact Disc. Listeners who are Reedophiles will enjoy the experience; those who aren't may well resent the intrusion.

Transformer is the post-Velvet Underground album that brought Reed recognition as a solo performer in 1972. It marked the beginning of his open experimentation with sexual identities under the guidance of David Bowie, who, together with Mick Ronson, produced the original LP. Hand-in-hand with Bowie, Reed took his "Walk on the Wild Side" on this disc, strolling right up the pop charts into the Top Ten. This cut, a musical exposé of the '60s activities of the Andy Warhol underground, is a revelation in the CD format. It is clear and crisp, the acoustic guitars split cleanly into left and right channels, the bass strong but subdued at center background, Reed's voice intimately placed front-and-center. Most impressive, however, is the presentation of the female chorus. Reed conjures them up with the lyric line, "And the colored girls say, 'Doo, da doo, da doo, doo-doo-doo doo . . .,' " and they appear, distant at first, split between right and left channels. Gradually, their voices grow closer with each repetition of the chorus, giving a very strong aural impression that they are walking directly toward the mikes. It's a clever production technique, and one which admirably makes the song's theme concrete.

The production on this 11-cut album is generally good, and at its best (surprisingly) when Reed's voice is the focal point. Despite his obvious vocal limitations, there is something fascinating about his delivery of those strange, tongue-in-cheek lyrics about weird and decadent characters. For the most part, his voice is recorded way up front and dead center. Supporting instruments have excellent spatial definition and clarity; the acoustic piano on "Perfect Day," for instance, has marvelous presence, as does the centered electric bass in "Walk on the Wild Side," the crisp finger-snaps on "Satellite of Love," and the delightful, hokey tuba on "Make Up" and "Goodnight Ladies." Monotonous as it may be, when Reed's voice is pulled too far back in the mix a certain vital spark is lost, as in "Vicious," the album's opener. This cut has a lifeless quality resulting from burying Reed's voice deep in midground instrumentation.

Lou Reed

This is a flawed but fascinating CD, a must for those in any way interested in the early works of this influential artist who is widely regarded as the grand old man of the punk movement. *Paulette Weiss*

Muddy Waters on Chess, "1948-1951," Vol. I
Vogue/Chess VG651 600052.

Chicago blues great Muddy Waters, born McKinley Morganfield in 1915, recorded his first successful discs for the venerable Chess label back in 1948. This French-import Compact Disc on the Vogue label covers the Chess period from that year until 1951, when his first band jelled into a stable performing unit. It includes some of his classic performances of that era, such as "I Can't Be Satisfied (Looking for My Baby)" with Big Crawford on bass, and "Honey Bee" with Little Walter on harmonica, Jimmy Rogers on second guitar, and Big Crawford on bass again. (However, it leaves out some of his other well-known numbers from that same period, among them "Rollin' Stone"—from which the now-famous rock band took its name—and "I Feel Like Going Home.") All the cuts here were recorded in Chicago, and all are treasurable souvenirs of the late bluesman's work.

Muddy's talents are self-evident, his distinctive bottleneck electric guitar skillfully supporting his soulful yet dig-

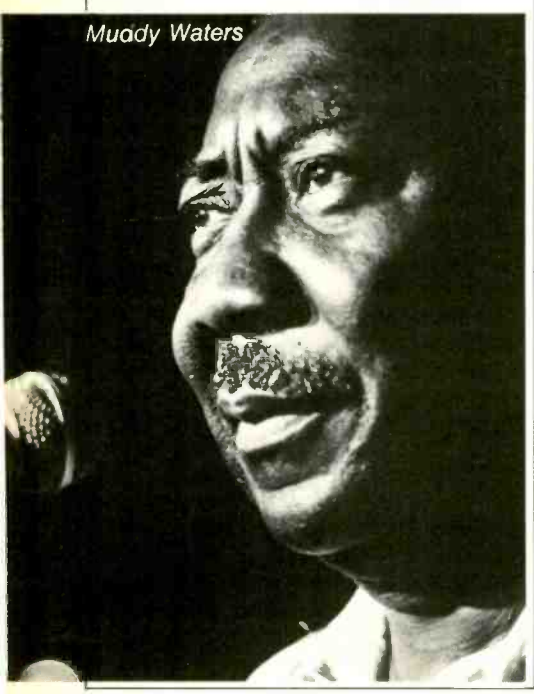
The real power and majesty of the great organ at Westminster Abbey, played by Simon Preston, has been well captured.

nified vocals throughout the 20 selections on this generous, single CD. Although it is easy to assess the great bluesman's skills here, it is difficult to judge the recording in terms of CD technology. These original recordings are unsophisticated in approach: Often, a microphone was simply plunked down in front of the performers while they played. Muddy's voice and guitar are usually strong and clear in the foreground, but balances vary widely from cut to cut. Vocals are skewed to the left or right, and, on the earliest sessions, drums and piano appear in the distant background. The recordings up until 1950 exhibit extreme surface noise, as though a copy were made from an old, scratched disc (this probably was the case, an old disc being the only remaining source for this three-decade-old material). It also sounds as though many of these recordings were "electronically enhanced" for stereo, a process that has given them a strange, artificial echo and a totally unnatural-sounding split between left and right channels. There is no information in the liner notes about the preservation or processing of this disc, a major oversight in view of the historic nature of the recordings.

From 1950's "Louisiana Blues" on, the material shows a marked improvement in recording technique. Balances are better, the instrumentals are more naturally centered, and that distracting artificial echo has been eliminated. Nevertheless, this is one of those cases where the clarity of digital recording serves to spotlight the flaws of the original analog method. This CD does provide an invaluable service, though, encoding the precious remains of Muddy Waters' performances in a format that will suffer no further deterioration. Despite its obvious imperfections *Muddy Waters on Chess, "1948-1951," Vol. I* deserves a place in any serious blues record collection.

Paulette Weiss

Editor's Note: We'd love to give credit to the importer who brought in this CD we purchased at Tower Records' main store in New York. However, Tower says, "Polygram," who says "Ain't us," and the Compact Disc Group says "Don't know. Besides, 'import' is a dirty word." The jewel-box copy insert shows four other CDs: *The Best of Chuck Berry,* No. 600033; *Big Bill Blues* by Bill Broonzy, No. 600041; *The London Howlin' Wolf Sessions,* which features Eric Clapton, Steve Winwood, Bill Wyman and Charlie Watts, No. 600051, and a second volume of Muddy on Chess, dated from 1952 through 1959, No. 600059. Now, if I get on an "RR" subway, I can get off at 8th Street and. . . .—*E.P.*


Muddy Waters

Widor: Symphony No. 5; Vierne: Carillon de Westminster. Simon Preston, organ.
Deutsche Grammophon 413 438-2 GH.

I have been playing Compact Discs using my mighty new B & W 808 monitor speakers, and such is the dynamic expression afforded by these speakers that much music takes on a new dimension.

Case in point is this DG recording of famed organist Simon Preston playing in Westminster Abbey in London. Preston performs the delightful "Carillon de Westminster" of Vierne and Widor's "Symphony No. 5." Most people are familiar with the toccata of this piece, but not with the rest of the Widor symphony.

DG has had some bad press on the quality of their CD recordings, but in this instance they have done a great job in capturing the essential qualities of this great organ. As played on the 808s, the power and majesty of the organ are awesome, with the sonority of the pedals stunning in impact. Preston does his usual masterful job, and his Widor toccata is fierce and exciting. A must for organ buffs. *Bert Whyte*


Simon Preston

Storm: Maynard Ferguson
Nautilus Super Discs NR57 DIDZ 10011.

I did the first stereo recording of Maynard Ferguson when he was with Stan Kenton in 1951 at the Blue Note nightclub in Chicago. As a youngster back then, he was noted for the stratospherically high notes he could play on his trumpet. As any trumpet player can tell you, playing in the very high registers is both difficult and taxing.

Incredibly, 34 years later, this CD recording of Ferguson is vividly audible proof that he has not lost his lip and can still go into orbit with his high notes. Here he fronts an outstanding big band and plays such well-known pieces as "Take the A Train," "As Time Goes By" and "Sesame Street," as well as some lesser known ones.

The music was recorded "live to two track" on Soundstream Digital, and, in spite of the difficulties of technique, balances are good. There is plenty of

Julius LaRosa, Michael Mark, Mel Torme, Marlene Ver Planck and Marty Nelson

Many fine musicians took part in this Compact Disc of Glenn Miller songs. I was thrilled to hear all the great tunes in glorious, clean sound.

big-band blast, with the sound very clean and placed in a moderately spacious acoustic perspective. Maynard's players call him Admiral, and he is unquestionably ruler of the high Cs! *Bert Whyte*

Beethoven: Piano Concertos Nos. 2 and 4. The Vienna Philharmonic Orchestra, Zubin Mehta; Vladimir Ashkenazy, piano.
London 411 901-2.

If you are a devotee of the Beethoven piano concertos, this CD is for you. The performance of Ashkenazy is simply thrilling—a brilliant traversal of the Second and Fourth Piano Concertos, played with passionate intensity yet displaying great lyrical insight. Ashkenazy's touch is incredibly clean, with precise articulation. Zubin Mehta is *en rapport* with Ashkenazy, and the great Vienna Philharmonic Orchestra displays its rich tonal resources.

The sound is marvelous. The piano is ideally placed, just forward of the orchestra. Piano transients are pristine clean, and the piano itself is rich and resonant with an especially sonorous bass end. The sound of the orchestra is very well-delineated, yet it has massive weight in the great climaxes. String tone is smooth throughout. If you want to hear the greatness of this CD, just listen to the rondo vivace finale of the Fourth Concerto. Breathtaking! *Bert Whyte*

For Duke: Bill Berry and His Ellington All-Stars
RealTime RT 1001.

M & K RealTime records got into CD production early in the game and then sort of dropped out of sight. Now they are back with one of their most well-known recordings, *For Duke*, which originally was a direct-to-disc project. This CD is derived from the analog, reference master tape that was made at the recording sessions.

Bill Berry leads the Ellington All-Stars in a number of the Duke's works, pretty well dressed up in Ellington-style arrangements. The disc opens with the immortal "Take the A Train," continues with "Mood Indigo" and goes on to "Things Ain't What They Used to Be," "Perdido," "Satin Doll," "I've Got It Bad and That Ain't Good," "I Let a Song Go Out of My Heart," and finally the infrequently played "Cotton Tail." A slight amount of tape hiss attests to the recording's analog origin. However, the close-up recording is very clean, with fine transient response on percussion, piano and string bass. The sound is wide-range and open, and the performances are all good, hewing very close to the Ellington tradition. *Bert Whyte*

Haydn: Symphonies No. 104 and No. 100. The Academy of Ancient Music; Christopher Hogwood, fortepiano.
L'Oiseau-Lyre 411 833-2.

Christopher Hogwood leaves his usual Christ Church, Oxford, recording venue and takes his Academy of Ancient Music orchestra to Kingsway Hall in London. In this favorite locale of the London/Decca label, Hogwood has recorded the Haydn Symphony No. 104 and the popular "Military" Symphony No. 100. Years ago, at the dawn of the LP era, Westminster Records became famous on the strength of their hi-fi recording of the "Military" symphony, with overemphasized but exciting cymbal clashes and tympani beats in the score.

John Dunkerley (who gives us those marvelous Montreal Symphony/Charles Dutoit recordings) and Simon Eadon were the engineers. The sound is very full in a warm, ambient field, with excellent internal balances and good definition. Here the engineers have chosen to play it straight and not indulge in creative percussion. Thus, the scoring and Hogwood's dynamics are followed scrupulously—which is not to say that the sound is dull. In fact, these are sprightly, well-paced performances that are marked by the always superb playing and musicianship of the Academy. *Bert Whyte*

In the Digital Mood: The Glenn Miller Orchestra
GRP Records GRP-D-9502.

This CD was a major undertaking; the bandleader, Larry O'Brien, heads up the official Glenn Miller Orchestra. Thus, the charts on all the familiar numbers are the original and authentic arrangements. Many well-known musicians participated, as well as such vocal luminaries as Julius LaRosa, Mel Torme and Marlene Ver Planck. This CD was recorded at A & R Studios in New York, with Larry Rosen and Dave Grusin doing the mixing. Once again, my associate Frank Dickinson was the digital engineer, and I heard this master tape, mixed down from the 3M 32-track recorder to the JVC digital mastering system, at Frank's studio. A slight amount of equalization was used in the CD recording.

All the great numbers are here, including "In the Mood," "Chattanooga Choo Choo," "American Patrol," "String of Pearls," "Little Brown Jug," "Kalamazoo," "Tuxedo Junction," "St. Louis Blues March," "Pennsylvania 6-5000," and "Moonlight Serenade."

Needless to say, using the original arrangements it is strictly nostalgia time. But what a difference in sound! Remembering the sound of the old Glenn Miller recordings, I was thrilled to hear these great tunes in glorious, super-clean, digital sound. The performances are very upbeat, superbly played in the Glenn Miller style. To put a point on it—they are authentic, the CD becoming a magic time machine that takes me back to the Glenn Island Casino in New York, where sweet young things whirled around the dance floor entranced by the romantic Miller music. Ah, well. It's hell to get old! *Bert Whyte*

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There is a nice balance between Cho-Liang Lin's violin and the piano of Sandra Rivers, with plenty of air around each.

Illustration: Barbara Kelley

Bravura: Cho-Liang Lin, violin; Sandra Rivers, piano.
CBS Masterworks MK 39133.

This CD showcases the musical talents of Chinese violin virtuoso Cho-Liang Lin. His piano accompanist is Sandra Rivers.

This is an interesting CD in several ways. For one thing, it was recorded in New York at the Lehman College Center for the Performing Arts, a relatively new hall and a recording venue I was eager to hear. For another, the CBS engineers used the Soundstream digital recorder with the new Brüel & Kjaer 4003 omnidirectional microphones.

Engineer Bud Graham struck a nice balance between the violin and piano, with the violin slightly forward and completely articulate. The hall acoustics seem fairly warm and spacious, and the instrumentalists are well-delineated yet have plenty of air around them. This adds up to a nice, clean, highly detailed sound with good, high harmonics. My only quibble is that Lin's violin tone was a bit on the lean side; however, he leaves no doubts as to his complete mastery of his instrument. He is a most accomplished technician and, as time goes by, will probably acquire a fatter, warmer tone.

Lin's program is well-chosen, from the de Falla "Suite Populaire Espagnol" to the Kreisler miniatures and similar music. He shows his dexterity and assured fingering and bowing in showpieces like Kreisler's "Chinese Tambourine" and Sarasate's "Introduction and Tarantella." I'd like to hear what Lin can do with some of the major concertos. *Bert Whyte*

Sundance: Kevin Eubanks
GRP-D-9506 DIDX 42.

Kevin Eubanks' fingers are hooked directly into his soul. There are a number of technically proficient guitarists out there who can spew out impressive flurries of notes, but their music is often a display of soulless virtuosity. Eubanks is blessed with both the fleetest of fingers and a sensibility that guides them to produce thoughtful, imaginative, memorable music.

The eight jazz selections on *Sundance*, Eubanks' second solo album, are his own compositions, and remarkable they are for their contrasts—in texture and tone, in mood and movement. Take, for instance, "The Sting," which opens this CD. It leaps out of the cleanest of digital silences with an agitated jangle of sound. Eubanks' wiry guitar pushes forward and halts abruptly, continuing this kind of thrust and parry over the equally frenetic accompaniment of his three bandmates. Just one cut down the road is "Ever Blue," with its drifting, beautiful melody and plaintive guitar lines in stark contrast to the nervous volatility of "The Sting." The contrast holds for aural texture as well as for mood. In "Ever Blue," Eubanks' electric guitar takes on an almost exotic, honeyed quality, a quality so soft and appealing that it seems not to have come from the same source as the harsh and insistent guitar of "The Sting." "The Sundance Began," from which the album gets its title, also holds intriguing contrasts. The cut drifts in, slow and easy, with a pleasant melodic figure leisurely repeating itself. Suddenly, a sharp burst of guitar sets off a frenzied rush in the manner of "The Sting." Just as suddenly, the rush ends and the drowsy melodic drift resumes.

Eubanks' acoustic work equals his amazing, bare-fingered electric technique. "Distant Focus" features an exquisite acoustic solo standing in sharp, sweet definition before a great, distant wash of windy synthesizer. This particular cut exhibits a marvelous sense of openness and space not present on most of the other selections.

The sound quality of this digitally mastered CD is quite good, with splendidly clean silences and generally clean sound. The production by Chris Hinze (for all but one cut) is also good, although it lacks the kind of clarity that really makes use of the CD medium. Eubanks is recorded at phantom center, where he belongs. In general, the excellent instrumentals—by Tommy Campbell on drums, Barry Brown on electric bass, and Gerry Etkins on synthesizers and Fender piano—branch outward from the center. Accompanying instrumentals are frequently split into left and right channels simultaneously, to very good effect.

The seven Hinze-produced cuts,

This recording of works by Richard Strauss is typical of the superb analog material available for transfer onto CD.

which were previously released on Keytone Records in Holland, are just a shade below the GRP recording standard. Executive producers Dave Grusin and Larry Rosen have well-deserved reputations for outstanding production work. The one instrumental on this album which they produced directly, "It's All the Same to Me," has a subtle sense of clarity. Here, Eubanks' acoustic guitar is a substantial presence; each tender squeak comes through with precision.

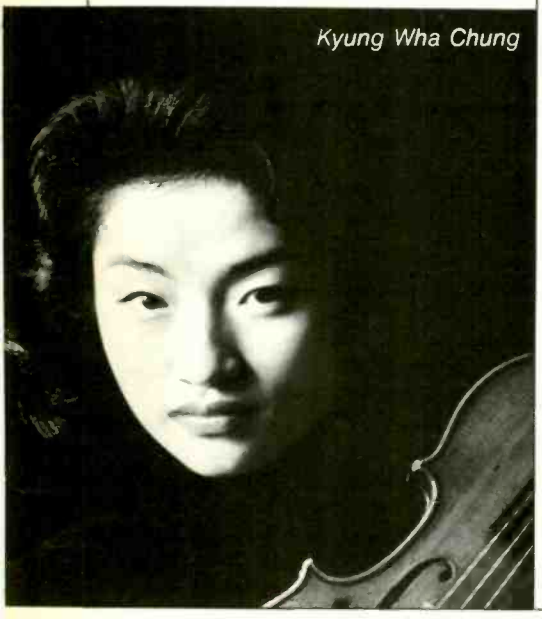
No matter what format he comes in, Kevin Eubanks is a talent to be reckoned with. He has made a splendid album and a good, if not perfect, CD.

Paulette Weiss

Berg: Violin Concerto; Bartók: Violin Concerto No. 1. The Chicago Symphony Orchestra, Sir Georg Solti; Kyung Wha Chung, violin.
London 411804-2LH.

I have always had great regard for the talent of violinist Kyung Wha Chung, ever since I heard her brilliant traversal of the Tchaikovsky violin concerto on a London/Decca recording of some years ago.

On this CD, she is now paired with the redoubtable Sir Georg Solti and his fabulous Chicago Symphony Orchestra. The Berg and Bartók violin concertos are an acquired taste; their atonal structures are not palatable to many people. Nevertheless, even in this music the lush, sweet tone of Chung's violin is nicely captured. So, too, is her obvious command of this difficult music. Chung's bowing and fingering are masterful.



Kyung Wha Chung

The recording is very clean and generally well-balanced, although the violin has a bit too much forward projection at times. The orchestra plays superbly, and now that the engineers have learned how to increase the reverb time in Orchestra Hall (with plywood panels and vinyl sheeting over all the seats), the orchestra plays in a nice, warm ambience.

Bert Whyte

Richard Strauss: Don Juan, Dance of the Seven Veils, Till Eulenspiegel, First Waltz Sequence from Der Rosenkavalier. The Cincinnati Symphony Orchestra, Thomas Schippers.
Mobile Fidelity Sound Lab MFCD 811.

This release from Mobile Fidelity is taken from the catalog of Vox Turnabout. Original recording and production were by Marc Aubort and Joanna Nickrenz, with the usual high quality that we have come to expect of this team. Recorded in 1976 in analog Dolby A format, the program comes across in CD as well as—or better than—many recent digital originals.

What is important is that Aubort avoids the pitfalls of multi-miking. His approach is to use only a few microphones, perhaps no more than three or four, across the front of the orchestra at a distance that gives the desired orchestra-to-hall relationship. From that point on, it's all in the hands of the conductor and players. There is genuine fore/aft, as well as lateral, imaging.

Thomas Schippers was in his prime when he died, and the work he was doing with the Cincinnati Symphony Orchestra was significant. In these works of Strauss, we hear him at his best. The orchestra is in top form, and the interpretations bear a stamp of originality without eccentricity.

I feel this release is typical of the superb analog material that exists in many record-company vaults. And once the newness of the CD has passed, we will, I hope, see more companies reaching for such 10- and 15-year-old treasures for reissue.

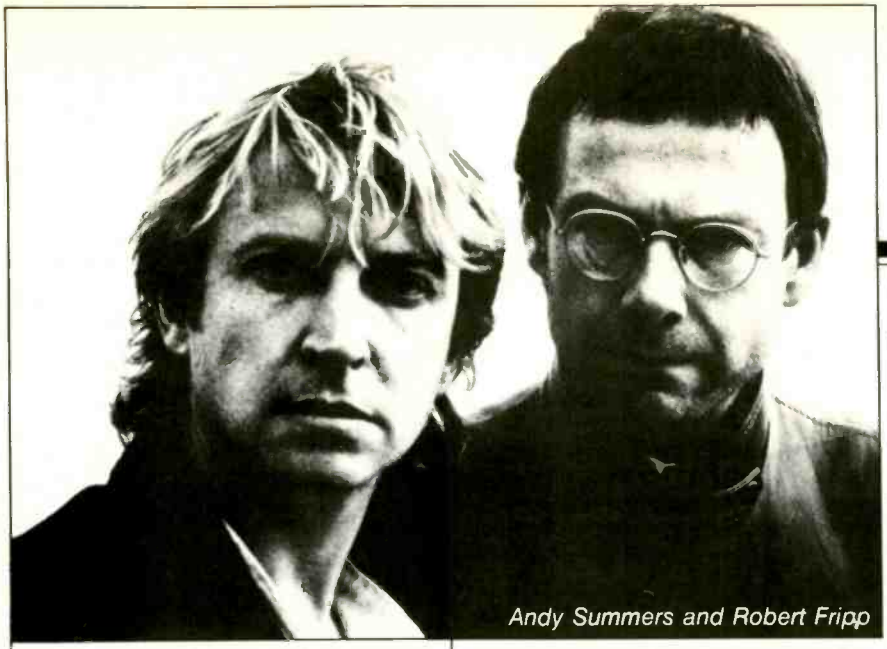
John M. Eargle

Thomas Schippers

Bewitched: Andy Summers and Robert Fripp
A&M CD-5011 DIDX 84

Bewitched is the stuff dreams are made of: Drifting, atmospheric manipulations of sound and hypnotic, suggestive interweaving of aural textures. Some disperse with the insubstantiality of smoke, while others swell and intensify, taking on almost tangible, monolithic proportions. This is the latest collaboration of guitar and synthesizer wizards Andy Summers, better known as one-third of The Police, and Robert Fripp, better known as the founder of King Crimson and exponent of Frippertronics, an early echo-delay system devised by Brian Eno.

It is also the stuff of a bewitching Compact Disc. Although there is some acoustic instrumentation here, this album creates a totally artificial listening experience with its banks of synthesizers and studio mixing and remixing. Conceivably, *Bewitched* could be reproduced in concert with the proper tape loops and prepared synthesizer programs, but its true place of origin is the studio, and it is best heard on record, period. The digital reproduction of the original analog disc allows every shimmer and honk to come through in pristine clarity; the extended dynamic



Andy Summers and Robert Fripp

Bewitched is the stuff dreams are made of. The material, rich with texture and nuance, provides multiple possibilities for each cut.

range captures the fade of an electronic whisper with the same sharp fidelity as it does the deepest boom of a TR 909 drum machine. Spatial presencing is almost irrelevant, although there is a stunning sense of movement as sounds seem to swell into the foreground or shrink and disappear into the left or right channel, or are swallowed up in the distant background.

Despite the fact that these 10 instrumental selections contain hints of melody and vague shadows of recognizable structure, they do not have the beginnings, bridges, and ends that we associate with conventional pop pieces. Their subject is sound itself; they float or scurry or thrum relentlessly and leave pictures forming in the listener's mind. For instance, the Spanish-inflected acoustic guitar in "Maquillage" may conjure up faint images of sun-splashed gardens in Madrid, a lace mantilla in the moonlight, or whatever association the listener's mind is stirred to make by the piece's provocative musical texture. Although entitled "Train," the fourth cut on this disc left me with an image of one of those atmospheric black-and-white movies of the '30s and '40s in which a white-robed woman walks, trance-like, into the misty swamps, drawn by the throbbing drums and rhythms of *macumba* (the black magic born in Brazil and practiced throughout the Caribbean). The great electronic "thonk" pattern that opens this cut and dominates the foreground comes out of total silence; an eerie synthesizer figure drifts behind the rhythmic "thonk" like dark mist over mysterious waters. Summers and Fripp may have been thinking of a train, but my willful brain insists on conjuring up images of its own. The material on *Bewitched* is so rich with texture and nuance that it provides multiple possibilities for each cut, despite the title chosen by its composers.

Keep in mind that you can't dance to it, you can't hum its tunes, and it is unlikely that you'll see videos for these complex tidbits on TV. This is repetitious, hypnotic music to be absorbed viscerally, not intellectually. Try *Bewitched* with headphones and a snifter of brandy or your favorite brand of funny cigarettes. A special CD for those with eclectic tastes in pop music.

Paulette Weiss

Girls with Guns: Tommy Shaw
A&M CD 5020 DIDX 138.

I never much cared for Styx as either a river or a band, but I really do like Tommy Shaw's solo debut, *Girls with Guns*. Mr. Shaw, Styx's ex-lead singer and songwriter, proves himself an intelligent, talented rocker. He has created a balanced albumful of slam-bang cuts and softer rock ballads, all with memorable melodies and arrangements, as well as lyrics that actually communicate coherent thought. I'm very much taken by the passionate tenderness that underlies the intensity of his vocals. I never noticed this quality when he was a member of Styx; maybe it was always there, maybe going solo set it free. Maybe I'm just in love. In any case, this 1984 album is high on my short list of discs to listen to again, in between the flood of new albums I'm supposed to review.

The hit title song is an exciting opener that crashes out of the gate at breakneck speed and doesn't stop until it slams to an abrupt end at the finish line. Shaw's got a way with guitars as well as girls, and lots of both is how he likes it. His work with acoustic guitar, six- and twelve-string electric guitars, and mandolin shines through with searing power on "Come in and Explain," with firm elegance on "Kiss Me Hello," and with simple folksy sweetness on "Little Girl World."

The arrangements and subtle special effects are inventive. I'm particularly fond of the use of overdubbing and echo on Shaw's expressive voice, which is applied and removed both to place his vocals tangibly in aural space and to emphasize the meaning of a lyric (the reverberated stretch added to the word "shout" in "Kiss Me Hello," for instance). Synthesizers buzz thinly against massed instrumentals, and tubby bass drums thump in marvelously restrained punctuation.

There is a tendency on the part of producer Mike Stone to bunch instruments up into his own version of Phil Spector's famous "wall of sound." This makes for an interesting CD transference problem, once again involving an analog recording that seems to have been made unclear deliberately for rock 'n' roll effect. The instrumental masses are quite blurred and muddy, with little of the crispness that usually comes across so well on a Compact Disc. Sibilants, in particular, are smeary and distorted, as is the extended hiss of a cymbal. True, the A&M Compact Disc version of this recording has wonderful silences between cuts, from which each song emerges with explosive power. However, the songs themselves are so chockful of sound that there are very few silent spots to admire within them. (The brilliant and effective dead pause on "Kiss Me Hello" is one notable exception.)

Whether a slight added clarity and a guaranteed extended playing life are worth the higher price tag of CD over LP is ultimately your decision, one rock fans rarely get to make with new recordings like this. *Girls with Guns* is one of the few pop CDs released at approximately the same time as the original LP, a move major record companies make only when they're absolutely certain that they're dealing with a hot artist. According to all reports, Shaw is heading up his own personal rock 'n' roll heatwave here in the chill of early winter. As for me, I'll take the CD and send Tommy Shaw a big box of chocolates.

Paulette Weiss

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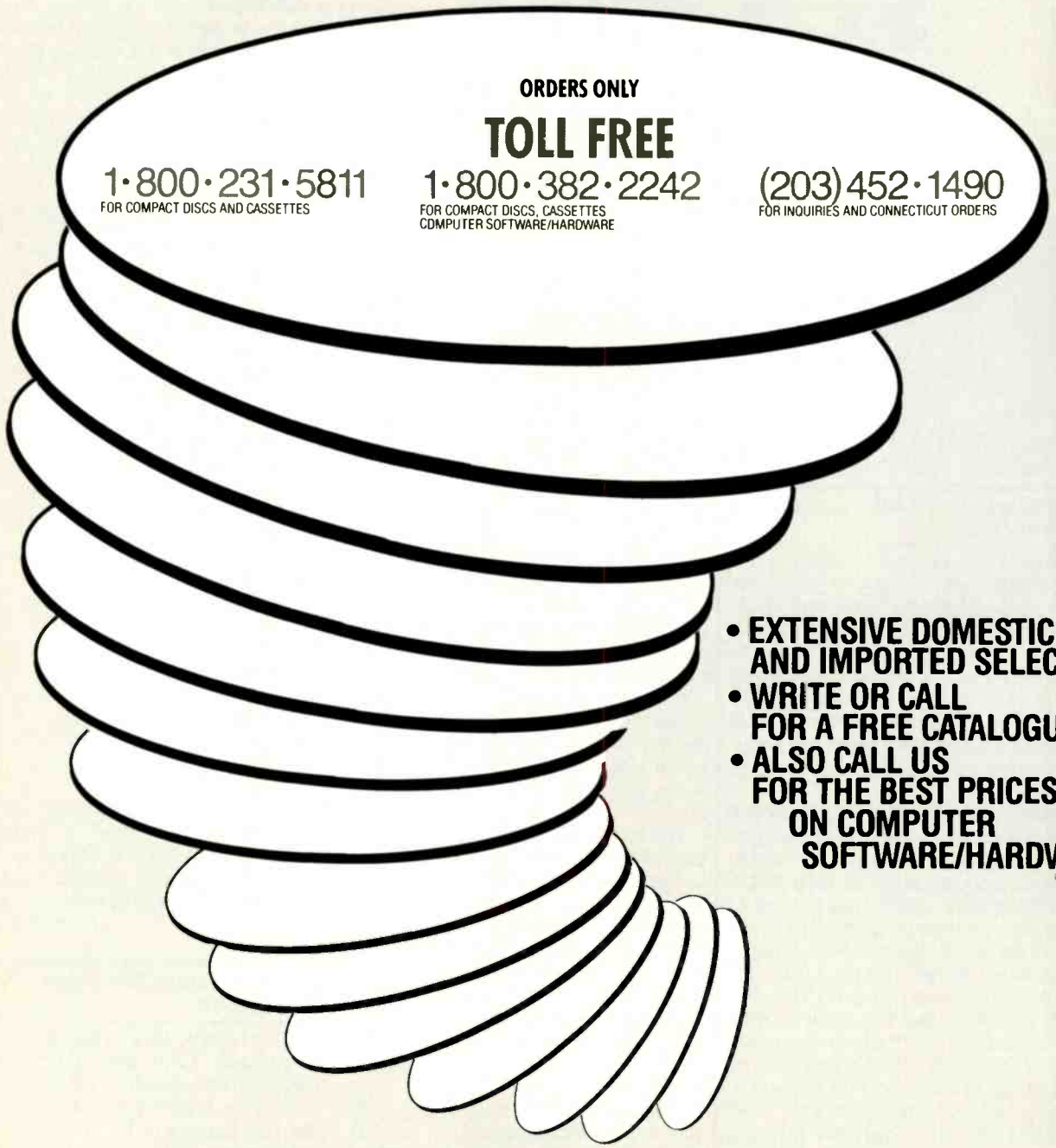

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The crystal-clear disc of Keith Jarrett's concert in Köln has an impeccable sense of space and surfaces that are pristine.

Illustration: Rick Tulka

The Köln Concert: Keith Jarrett
ECM 1064-2.

When's the last time a piece of popular music brought tears to your eyes with its breathtaking splendor? Well, be prepared and get your hanky out when you put Keith Jarrett's *The Köln Concert* on your Compact Disc player. In truth, you won't be weeping throughout, for in between its moments of sheer majesty and introspective beauty, this recording swings, rocks, drifts and soothes.

Jarrett is nominally a jazz musician, although his work defies true categorization. (*The New Schwann*, that venerable reference guide to recordings, has listed him in its classical category.) This concert recording of a 1975 performance at the Opera in Köln, Germany catches Jarrett in one of his most accessible modes, weaving beautiful melodies throughout a typical free-form performance. There is a wonderful ebb and flow to this material, as Jarrett drifts along in the wash of a lovely introspective pattern, then builds subtly and slowly to a swelling crescendo from which he smoothly descends to the next melodic well.

Although this is a solo piano concert, Jarrett's music has moments of such density and richness that the memory retains the impression of an orchestrated piece. In contrast, there are also passages of such shimmering delicacy that they seem to have been created in the listener's mind and not by a musical instrument at all. Such a moment occurs about a third of the way into the first piece, when a last, deep piano note reverberates and fades, leaving a hazy cloud of sound into which a quick, light arpeggio is tossed like a glittering handful of silvery fairy dust.

The recording is ECM splendid. It is crystal-clear, with an impeccable sense of space; just the sound of the audience applauding conveys an accurate aural impression of the size of the hall. Hats off to the producer, once again ECM's brilliant Manfred Eicher, and to the engineer, Martin Wieland. Surfaces are, of course, pristine, and those all-important stretches between distant, thoughtful notes are blessedly silent.

One problem here has nothing to do with the technical handling of this CD. Keith Jarrett, like a few other instrumentalists who become totally engrossed with their work (the late Glenn Gould comes to mind), has a habit of accompanying himself vocally. His subdued but audible whoops, howls, and groans of delight may prove distracting to some listeners. Personally, I enjoy hearing the artist get so lost in his own performance.

Although this CD offers more than 59 minutes of Jarrett at Köln, it is missing the fourth side of the original two-disc vinyl album. For faultless, durable sound, stick with the CD. For seven more minutes of Keith Jarrett's exquisite pianism, get the double vinyl set as well. *Paulette Weiss*

Max Steiner: Film Score for King Kong. The National Philharmonic Orchestra, Fred Steiner.
Southern Cross SCCD 901.

Max Steiner was unquestionably one of the finest composers of film scores from the '30s through the '50s. The hallmark of a fine composer for the film medium is, of course, the knack for integrating the score into the action of the film itself. Not much film music can stand on its own in an expanded concert presentation, and the very attributes that make it good for the film may militate against it in the concert hall.

The exception, of course, is the symphonic synthesis, often done by someone other than the composer, which presents highlights of the score in a condensed form 8 or 10 minutes in length. If you recall the immensely successful film music series on RCA conducted by Charles Gerhardt, you know what I have in mind.

For anyone except the real film buff or Steiner devotee, there is simply too much *King Kong* here. Otherwise, the music is beautifully played, and the recording engineering and production are excellent. *John M. Eargle*

Mountain Dance: Dave Grusin
GRP D-9507.

Have a drink. Grab a handful of nuts or pretzels. Chat with a friend. Put Dave Grusin's *Mountain Dance* on your CD player. Listen, sip, talk, listen, nibble. Get the picture?

Mountain Dance will not exactly command your full attention. The tunes are attractive, the recording—another

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You and Me Both **by Yaz is a compelling disc, one that gives the repeat button on your CD player a reason for existing.**


Alf Moyet of Yaz

rare pop original digital master—is excellent, but, depite the obvious technical competence, both in musicianship and studio-to-disc processing, there's little here of real substance.

The cuts are uniformly pretty, varying in tempo and intensity from the introspective Grusin acoustic piano solo, "Thanksong," to more uptempo boppers like "Captain Caribé." With the exception of the somehow thin "Rag Bag," with its skinny, whining synthesizer accents, the recording is technically excellent throughout; the CD captures delicate textures and textural contrasts, lovingly reproduces the wide variety of sounds the keyboards and synthesizers whip up, and gives real definition to aural space and instrumental placement.

Grusin and company dared to record live, direct to a two-track digital format. This meant forgoing the remixing step on which most pop records depend for final balancing, diminishing and/or eliminating mistakes, and generally perfecting the final product. Give Grusin a pat on the back for his bravery. Then have another drink. Have a pretzel. . . . *Paulette Weiss*

You and Me Both: Yazoo
Mute Records VG 651.

Yazoo's second album, *You and Me Both*, is soulful, doleful, bright and bouncy. It's a bittersweet universe painted by the sparkling synthesizers of Vince Clark, which conjure up pinpoints of light and vast surfaces of lifeless planets, and by the equally evocative vocals of Alison (Alf) Moyet, which ground the songs in an earthy blues style. Like the real universe, there's lots of empty space between these twinkling stars and solid planets. The velvety silence of the Compact Disc defines the music and lyrics without the lunar dust that clouds the surface of most standard analog LPs.

The imaging on this disc is divine, creating the illusion that each musical texture comes from a different source instead of being cooked up in the same oscillating circuit. Besides being well placed, each synthetic voice is different, ranging from fragile chimes to powerful aural explosions, yet they never devolve into cheap sound effects created for their own sake. The all-too-humanly flexible voice of Moyet adds depth and poignancy to the mellifluous melodies and sad lyrics of lost love.

Yazoo (known as Yaz here in the U.S.), creates moods ranging from the outer-space solitude of "Mr. Blue" to the delightfully imbecilic "Happy People," who "believe in having fun and smiling all the time" (Vince sings on this one). Recurring undercurrents tell of valiant struggles against death, war, and depersonalization. In "Softly Over," the spasmodic percussion echoes lyrics about a collapsing relationship. And still, a cheerful playfulness in the music and an assertive strength in the singing challenge the sorrowful mood.

It's compelling stuff that works on many levels, rewarding close and repeated listenings with discoveries of low-level comments from the keyboards behind the primary riff or the rough-edged, seductive intonation in Moyet's voice. It's an album of many moods, irresistibly danceable when played loud and comfortably soothing when played softly. And it isn't marred by the same pointless noodling and pretentious gibberish that infested two tracks on Yazoo's first album, *Upstairs at Eric's*.

This album, which, sadly, is the final collaboration of Clark and Moyet, has a consistency that gives the repeat button on your CD player a reason for existence: You can nod off to the pretty songs or keep the neighbors awake all night with your nonstop aerobic dancing. A few of the riffs get caught in a rut, but what the heck. The 11-song disc lasts for only 40 minutes and 28 seconds, but you can set it to repeat for as long as you like. And I like.
Paulette Weiss

Desert Moon: Dennis DeYoung
A&M CD-5006 DIDX 82.

1984 was the year Styx shot soloists out onto the pop charts, and the bullets were flying fast and furious. The big hit for ex-Styx keyboardist and vocalist Dennis DeYoung was "Desert Moon," the title song of his first solo album. This poignant ballad of innocence and first love was accompanied by a video remarkable for its romantic restraint, considering its potentially sappy, sentimental subject. Restraint may be the key descriptive term for this entire recording as well, as becomes apparent in the Compact Disc version released at approximately the same time as the analog LP.

This is a nicely eclectic gallery of songs. The energetic opener, "Don't Wait for Heroes," rocks along with some neat keyboard action on an attractive tune from DeYoung's own hand. With its tongue-in-cheek, male, doo-wop vocal chorus; precious, all-girl backup vocals, and white-boy street rap from DeYoung, "Boys Will Be Boys" pokes fun at the "forever young in the summertime" rock genre. The basic rock line on "Suspicious" is shot through with jazz inflections, from its lightly swinging chorus backup to DeYoung's bluesy but bogus synthesized harmonica. DeYoung has a dead-center sense of humor that appears throughout the album; it comes through wonderfully in both the musical arrangements and lyrics of "Gravity." Against the celestial "bom bom bom" of a heavenly chorus, DeYoung

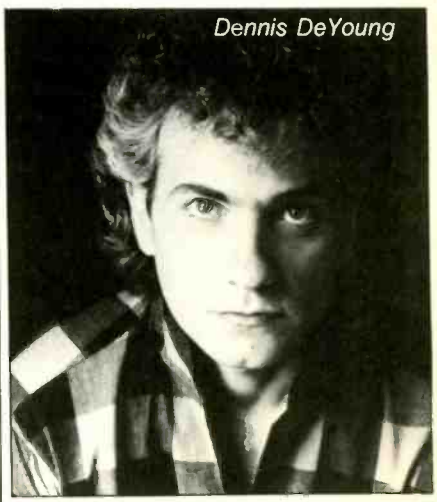
Dennis DeYoung

Illustration: Rick Tulka

Chick Corea's acoustic piano is really alive, a palpable aural presence which seems to radiate music in all directions.

rocks out with a line about wanting to climb Mount Everest but "... that mountain's so steep/I know my nose will bleed, 'cause gravity don't sleep/It don't sleep."

Where the aforementioned restraint becomes obvious is in the production and execution of some of these intelligently arranged and attractively melodic tunes. The clarity of the Compact Disc version exposes a production job just a shade too staid for the material. There is an adequate sense of aural space but little imagination used in spatial presentation. Most vocals and instrumentals cluster at mid-center. There are, indeed, forays into split-channel effects; instruments do not necessarily occupy the same aural location through all eight cuts, and a peppering of electronics—like the stretching of the vocal chorus on "Fire" and the very subtle secondary delayed echo on DeYoung's vocal in "Boys Will Be Boys"—do add extra interest. However, there's a general lack of power here, a subdued quality to DeYoung's vocals and to many otherwise fine instrumental passages that may speak of his inexperience as a producer.

The CD's sparkling-clear sound is evident from the rock-solid opening drum that rolls out on the disc's first cut, to the last fading note of the saxophone that closes out the final cut, "Dear Darling (I'll Be There)." This is one of those borderline CDs. Whether you shoot the works on the more expensive digital package or set your sights on the less costly analog disc, you'll wind up with a satisfying solo first from Dennis DeYoung. *Paulette Weiss*

Bartók: Bluebeard's Castle. The Hungarian State Opera, Janos Ferencsik. **Hungaroton HCD 12254-2.**

I looked forward to this CD with much anticipation. Bartók's early opera has a particular kind of magic that can only be described as Magyar, which is inherent in the music as well as the Hungarian language itself. (The old Walter Berry/Christa Ludwig collaboration with Istvan Kertesz on English Decca captured this magic so well.) "Bluebeard" seemed such a natural for Hungaroton, but, alas, it is not the case here.

The problem is the two soloists. Instead of real Hungarians, we are presented with Russians. Not Russian voices of the Boris Goduonov sort—but voices of the Soviet type! The dialog between Bluebeard and his latest wife, Judith, comprises the entire opera, and to hear it carried out in rough, declamatory style is simply not right. Even the Hungarian language doesn't help; it might as well be Russian.

In purely recording terms, the production is excellent, but I really can't recommend this CD on musical grounds. *John M. Eargle*

Children's Songs: Chick Corea **ECM 25005-2.**

The first gentle but firm piano notes of Chick Corea's *Children's Songs* emerge crisp and clear against the clean silence of this sweet ECM Compact Disc. With the clarity of the bold, oversized letters on the white pages of a child's first reader, note after note possesses a vivid presence, whether standing alone or bouncing along in a tumble of headlong melody.

I cannot praise the sound quality of this original digital recording too highly; Corea's acoustic piano is so *alive* on this CD. Firmly situated in the phantom center channel, the piano is a palpable aural presence which seems to radiate music in all directions. There is a slight echo on extended notes which I find appealing; it heightens the sense of a rooted location for the instrument. I suspect this echo is a product of the West German studio—Tonstudio Bauer in Ludwigsburg—where *Children's Songs* was recorded, and also a production choice of Manfred Eicher, who, ably assisted here by engineer Martin Wieland, is responsible for some of the most exquisite recorded sound of the past decade.

The intriguing music so lovingly preserved is certainly not kid stuff, despite the misleading title. Here are 19 deceptively simple bits of mood and melody, with the longest running just over 2½ minutes, and the shortest a mere 38 seconds. Except for an extended "Addendum" incorporating violin and cello, these are all solo acoustic piano pieces. There are actually 20 solo pieces if you go by Corea's original notation, although ECM has put two solos together and notes the CD as having 19 solo pieces. Corea maintains the illusion of simplicity with repetitive, rhythmic, left-hand figures, but what he does with his dexterous right hand—that's another story. Some pieces meander through snatches of lovely melody like a butterfly lightly exploring a meadow. Others scurry intensely in all directions like an ant on an undefined mission. Floating or scurrying, thoughtful, querulous, ominous, prancing—so many moods are created expertly in swift mini-chapters. The 5-minute-plus "Addendum" adds violin and cello to Corea's piano in an exciting interplay which shows off this CD's marvelous dynamic range and further enhances its wonderful sense of aural space.

Children's Songs is one CD in an 11-title 1984 release from ECM. The whole package is splendid, and this lovely volume will delight the child in you and leave your adult sensibility satisfied, to boot. *Paulette Weiss*

Joe Beck's music is interesting and well scored. It ranges from a sort of introspective collage of guitar to lusty romps with the sextet in full cry.


Joe Beck

Friends: Joe Beck
DMP CD-446. (Available from Digital Music Products, Rockefeller Center Station, P.O. Box 2317, New York, N.Y. 10185.)

Tom Jung continues to expand his Digital Music Products catalog with mostly small-scale stuff—but, without question, some of the best-sounding CDs on the market.

On his latest, *Friends*, he has recorded the redoubtable Joe Beck with his electric guitar, along with some stellar sidemen making up a really free-swinging sextet. All but one number in this generous 58:55 program was composed by Joe Beck. It is interesting, well-scored music and ranges from a sort of introspective collage of guitar, with bells and percussion exhibiting much energy in the upper harmonics, to lusty romps with the sextet in full cry. The group frequently sounds like Weather Report.

As usual, Tom Jung has provided superb sound, recorded close-up with moderate reverb. It is pristine clean, highly detailed, beautifully balanced. Another winning effort! *Bert Whyte*

Don't Stop: Jeffrey Osborne
A&M CD 5017 DIDX 85.

Don't Stop punches its way out of clean silence with a fistful of musical muscle, and it's a CD knockout. True to its title, Jeffrey Osborne's high-energy 1984 recording never stops delivering fine, fine music. With the exception of a couple of sweet, soul-tinged ballads such as "Let Me Know," the rabbit-punch rhythms of these cuts sweep them along at a swift clip. There's a wonderful staccato quality to these arrangements; percussion, synthesizers, bass, drums, and guitars jab cleanly into aural space, held together by Osborne's rich, commanding vocals at center ring. This staccato quality really shows off the capabilities of A&M's CD. The sound is crisp and pristine, each note wonderfully defined, whether it's deep in the mix like the faintest of chimes in the far right channel of "The Power," or way up front, like the lovely ringing guitar work by Michael Sembello on the opening title cut.

Here I must make note of a major error in A&M's otherwise superior liner booklet, which is one of the rare CD inserts to contain complete lyrics and credits for the folks involved in this hot project. The credits for the title cut and the one that follows it, "Let Me Know," apparently have been reversed. The giveaway lies in the string credits: Hard as I listened, I could discern no strings attached to "Don't Stop," contrary to the credit line. Producer George Duke's own acoustic piano solo is a no-show on "Don't Stop" as well. However, both strings and piano appear on "Let Me Know."

Although this album has an R&B sensibility and a slam-bang energy associated with heavyweight dance music, it offers much, much more, and it is patently unfair to categorize it so narrowly. Osborne takes a lightning stab at funk-rock in "Hot Coals," knocks the ladies off their feet with the sensual, string-sweetened balladry of "Let Me Know," and presents a cast of pop champs—Pat Benatar, James Ingram, and Kenny Loggins among them—in a rocking yet voluptuous "Live for Today." His lyrics are pop/literate, and his vocal and instrumental command are unquestionable.

Producer Duke deserves a trophy for his efforts, as does chief engineer Tommy Vicari and the large team of assistant engineers who turned out this championship recording. Spatial presentation is spectacular. Osborne's voice is center ring, where it belongs, surrounded by an instrumental arena of real aural depth and breadth. A high point is the ear-opening sense of movement created by a synthesizer in "The Power." The synth, sounding like a giant slowly inhaling, sweeps from right to phantom center to left channel as the cut ends. In fact, *all* the cut endings are impressive and a splendid showcase for the CD's extended dynamic range.

This CD is, both musically and technically, a real winner. *Paulette Weiss*

Buxtehude Organ Works, Volumes 1 and 2. Wolfgang Rubsam, organ.
Bellaphon 690-01-007 and 690-01-017.

Bellaphon is a small German label whose CDs are now being distributed here. Their classical catalog seems to be largely baroque offerings, but there is a significant jazz segment as well.

These CDs are the first of the complete set of Buxtehude's organ works, and the decision to issue them all on CD is a bold one. Rubsam has chosen different instruments for the two discs, and both are in quite reverberant environments, upwards of 5 seconds. A good bit of musical detail could be lost under such circumstances, but Rubsam has paced the music in such a way that the structure comes through clearly. His performances tend to be a little mannered, at least in my opinion, and some of the drive of the preludes and fugues is sacrificed to a too flexible and pliant rhythmic line. However, this approach is well suited to the choral preludes, which make up a large portion of both programs.

Acoustics aside, the recorded sound is clean and realistic, if a bit distant. *John M. Eargle*

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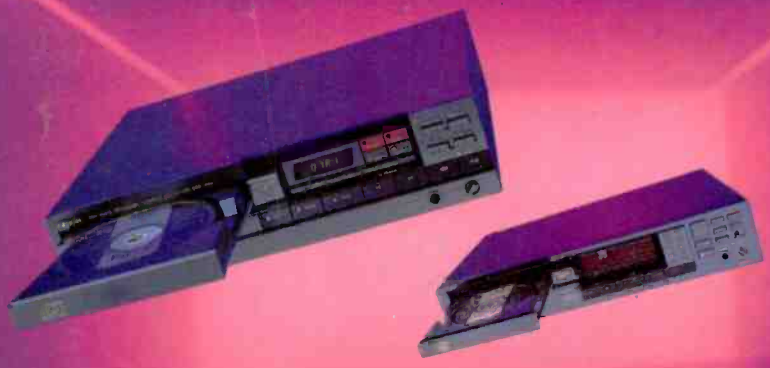

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