

# SONY'S DISCMAN PORTABLE CD PLAYER

by Julian Hirsch

*Now your Compact Discs can go just  
about anywhere you can go*

**I**MAGINE a digital-audio Compact Disc player whose dimensions (5 x 5¼ x 1½ inches) and weight (1¼ pounds) approximate those of a stack of four CD's in their plastic cases. Imagine also that this player is not an oversimplified novelty, but a full-featured stereo component with all the important features of larger CD players. Moreover, although its electronic performance is essentially equal to that of a standard home CD player, and although you can hook it up to your component system and listen to it through your speakers, it can be battery-powered and is suitable for portable operation. The remarkable device you've been imagining is Sony's D-5 Discman portable CD player. It is available now, and it is selling for just \$299.95.

To be sure, the Discman isn't all that tiny in actual use. It requires an external power supply, but even in that it's versatile. You can use its a.c. adaptor, which plugs into a wall socket and connects to the Discman through a 6-foot cable. Or, if you intend to carry it around, you can put it in a carrying case with a battery pack that takes six C cells. The case, the EBP-9LC, does not come with the player and will cost you an addition-

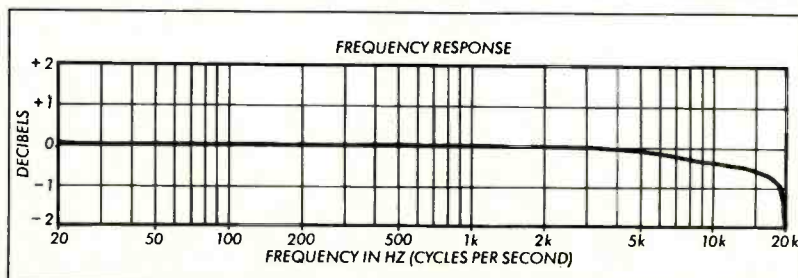
al \$49.95. The C cells can be replaced by a rechargeable NiCad battery pack (KR-C-F-2, price to be announced) that provides 5½ hours of playing time per charge. And you can even get a car-battery cord for it (DCC-120, \$36.50).

Despite the additional space taken up by the power supplies, the D-5 is well suited for use in cramped and/or mobile quarters like campers, trailers, summer homes, boats, or airplanes. And, of course, those who must have the latest electronic wonder on their belts will probably choose to carry a Discman (in its case) in lieu of a cassette Walkman. A more attention-grabbing personal portable could hardly be imagined! Its performance is quite comparable to that of most full-size home units, we discovered, and its features include track selection—one at a time—up to the maximum possible of ninety-nine, visual display of track and time status, and fast scanning in either direction with audible monitoring of the program. Yet it is

much smaller and considerably less expensive than any other CD player we know of.

The Discman is a top-loading player; pressing a button on the top righthand corner of the unit pops the disc compartment open. A loss of power will release the compartment lock so that a disc can be removed if the batteries give out. The rear of the unit has the input jack for the power sources and a mini stereo phone jack used for the D-5's fixed line-level output. A 3-foot cable with a mini stereo phone plug on one end and two conventional RCA phono plugs at the other adapts the D-5 to the inputs of a component stereo system. The variable headphone output is on the right side of the player. It too is a mini stereo phone jack, and it can be used for driving any dynamic headphone.

The remaining controls are on the front panel—they *are* the front panel. There are fewer controls on the Discman's front panel than on the simplest home CD players because many of its buttons serve more than one function. For example, the PLAY button (single arrow) is also the PAUSE control, depending on what state the player is in when the control is







### HIRSCH-HOUCK LAB MEASUREMENTS

**Maximum output level:** 1.9 volts  
**Left-right level match:** 0.2 dB  
**Maximum headphone output level:** 2.6 volts  
**Total harmonic distortion at 1,000 Hz:** 0.0036% referred to 0 dB; 0.0025% referred to -10 dB; distortion masked by noise at lower levels  
**Intermodulation distortion:** 0.008% referred to 0 dB; 0.016%

referred to -10 dB  
**Signal-to-noise ratio:** 86.5 dB unweighted; 91 dB A-weighted  
**Channel separation:** 86 dB at 1,000 Hz; 55.5 dB at 20,000 Hz  
**Frequency response:** +0, -2.1 dB from 20 to 20,000 Hz (see graph)  
**Interchannel phase shift:** 3° at 10,000 Hz, 5° at 20,000 Hz  
**Square-wave performance:** slight

20,000-Hz ringing after level transitions  
**Cueing time:** 5.5 seconds  
**Impact resistance:** top, A; side, B  
**Cueing accuracy:** A  
**Defect tracking** (figures are size of largest defect successfully tracked): signal-surface damage, 900 micrometers; painted dots, 800 μm; simulated fingerprint, pass

pushed. Pressing the MODE button (near the display) turns the double-arrowed track-skipping buttons into fast-scan controls for high-speed audible cueing at ten times normal speed. A REMAIN button toggles the display between showing the current track, with its elapsed playing time, and showing the remaining total playing time and the remain-

ing number of tracks on the disc. The unit's power is controlled by a slide switch on the lower front edge. Nearby is the headphone-volume control, a knurled wheel emerging sideways from the player.

No headphones are supplied with the D-5, but any dynamic headphone should do. Home-type headphones, with large 1/4-inch phone

plugs, will need an adaptor to fit the D-5 headphone jack. Sony, of course, recommends a Sony headphone for use with the Discman (the MDR-M77, \$85).

The unit we tested was a prototype, one essentially identical to planned production models. Our measurements were made with the same standard test discs we use for

## GETTING SMALL

**T**HREE technological developments have given Sony designers the ability to cram the works of a CD player into the space of the Discman:

- use of large-scale integrated circuits (LSI's),
- a reduction in the power necessary to drive those circuits, and
- a substantial reduction in the bulk of the laser-optical scanning assembly.

The "large" in LSI actually refers to

the amount of circuitry integrated on a silicon "chip"; the chips themselves remain smaller than thumbnails. The Discman's primary LSI actually incorporates the functions (and the thousands of transistors) previously found in four separate LSI's, and some "discrete" circuitry besides. These functions include motor speed control, data-flow synchronization, digital-data demodulation, subcode (track number and timing) extraction, error detection and correction, and data interpolation.

A related, and crucial, characteristic of the chips used in the Discman is that many of them are made by the CMOS process. This manufacturing technique produces chips requiring a

small fraction of the power that the earlier, easier-to-produce NMOS chips used. Also contributing to lower power consumption is the use of a liquid-crystal display, which uses much less power than LED's or vacuum-fluorescent indicators. A glance at the large power-supply transformer and bulky voltage-regulation circuits in any home CD player will demonstrate how important a lowering of operating power is to the reduction in player size. Besides, low power consumption also permits battery-powered, portable operation, the raison d'être of the Discman.

Sony also shrank the size of the



our home CD-player tests. All measurements were made at the ends of the supplied phono-plug adaptor cable as the D-5 drove a standard IHF load (10,000 ohms in parallel with 1,000 picofarads capacitance).

As the chart shows, the Discman lived up to the standards established by the many home-component players we have tested, with distortion and noise performance to compare with the best. The frequency response, unlike that of other CD players we have tested, had no undulating "ripples" at the high frequencies; instead, it sloped off slightly above 5,000 Hz. This is hardly anything to be concerned about—the response was flat (+0, -0.2 dB) in the crucial range up to 4,500 Hz. Anyway, these response deviations fall within Sony's specifications for the player and are audible only in direct comparisons.

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Our tests of cueing accuracy, error correction, and the ability to withstand physical shock were performed subjectively, as usual. Since the D-5 doesn't have pre-programmable track selection, for cueing time we measured the period required to start the Philips TS-4 sampler and to select and start playing Track 15. Interestingly, this

time, even with fifteen pushes of the track-advance button, was around the average value we get with more easily cued home units. The transition between Tracks 17 and 18, which have no silent interval separating them, was cued flawlessly, with absolutely no clipping of the opening of Track 18.

Like the best home units, the Discman played all the calibrated defects of the Philips TS-4A test disc without audible problems. We did not experience any error detracking on any of our music discs either.

When we tested it for immunity to physical shock, the Discman did very well. It was quite resistant to tapping on the top cover (above the disc) and moderately resistant to side impacts. And while it was playing a disc, the player could be picked up and moved around, turned over, or otherwise handled as though it were being worn over the shoulder.

Try as we may, we cannot escape the sense of awe and amazement that the Sony Discman arouses in us. Less than two years ago we tested a number of first-generation CD players from various manufacturers. They were bulky home-stereo system components, typically about the size of a stereo receiver, weighing as much as 30 pounds, and costing upwards of \$1,000. Most of them could not play through all the calibrated defects on the Philips TS-4A test record, and some were so touchy that you had to avoid tapping their cases, even lightly, under penalty of detracking. Yet, here we have a pocket-size CD player, in most respects a better performer than those early models, at about a third of their price. Refreshingly free of flashy features (where could one fit an array of lights and buttons

on a miniature front panel?), the Discman is so easy to use that it took us only a few minutes to feel at home with its operation. Is it any wonder that we are impressed?

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*Our laboratory test results show that the Discman CD player lives up to the standards established by the many home-component players we have tested, with distortion and noise performance to compare with the best of them.*

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Granted, some of its measured performance figures are not quite the equal of the latest home CD players. To put this into perspective, however, the performance of the Sony Discman so far surpasses that of any analog record player that no comparison is possible. In spite of this, it is priced just above a typical budget-category analog turntable fitted with a good cartridge. The only difference that we think might be audible between the Discman and some other CD players (in a direct A/B comparison) is its slightly reduced high-frequency output—which may be peculiar to our sample. In any case, it is one of the most trivial complaints one could make about any hi-fi component.

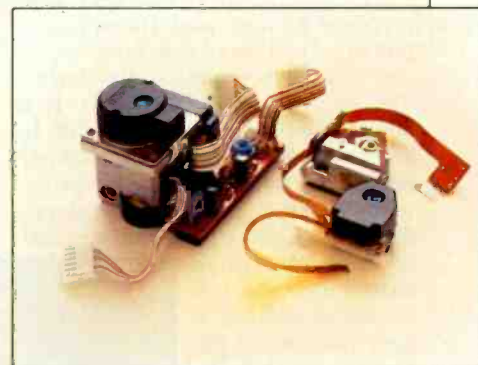
If you are violently opposed to the Compact Disc concept, for whatever reason, this little gem probably won't change your mind, but *you* are the loser. If you have been waiting for the price of CD players to reach affordable levels, your wait is over. And if total portability appeals to you, here it is. □

*optical subsystem, containing the semiconductor laser, lenses and other optics, and some of the laser-support circuitry. As the picture shows, the original Sony laser system (left, as used in the company's first-generation CD players) was a bulky affair. By folding the optical path and miniaturizing the electronic components, Sony made the optical system at the far right small enough for use in the Discman and automotive CD players.*

*Although the Discman will be small enough for most people, there is still the question of how much smaller it can be made. Much of the space inside is devoted to the "analog" portions of*

*the player (the digital-to-analog converter IC, two analog output filters, and their associated circuitry). The use of digital filter chips could substantially reduce the space needed for the analog circuits. And it's possible that the optical system, small as it is, could be further reduced in size, though only slightly because of optical-quality requirements. On the whole, I'd guess that a 25-percent reduction in overall volume might be possible over the next couple of years. Making a smaller CD player, however, could lead to problems: the controls might be too small to use, the displays too small to see—and the disc may not fit inside!*

David Ranada



*Sony miniaturized its first CD laser for use in the Discman (right).*