



TECHNOLOGY

It's a CD, but full of facts not music

CD-Rom costly, but it stores as much as 1,500 conventional floppy disks

By Simson Garfinkel
Special to the Globe

The silver platters in the store window look like ordinary musical compact disks, but put one of these CDs in a hi-fi system and all you hear is a monotonous repeating buzz.

But put the disk in a special player connected to a personal computer, and a world of information is instantly before your eyes.

The disks, each 4.7 inches wide, are CD-ROMs (for "Compact Disk Read Only Memory"), and a single one can store 552 megabytes of information — the equivalent of more than 225,000 pages of single-spaced typewritten text or 1,500 conventional magnetic "floppy" disks.

With a CD-ROM version of "Books in Print," the standard directory of all available books, a book store customer can locate any one of 750,000 books indexed on the disk simply by typing into the computer a few words from the book's title — not necessarily the ones that come first. It's faster and easier to use than the 6-inch-thick bound volume.

"A bookstore can't carry more than 100,000 titles," said Hillel Stavis, owner of the Wordsworth bookstore in Harvard Square, but with the CD-ROM, all of the books in print can be searched as easily as those actually in the store's inventory. And once a book is located, it can be quickly ordered via a few more commands on the same computer.

The technology's potential was persuasive enough to lure Clark C. Abt away from the social research firm he had founded, to establish in the Harvard Square area what Abt claims is the only store in the world that sells CD-ROMs.

"I got very excited about electronic publishing and its potential for disseminating permanently-useful knowledge in a cost-effective way," he said in recent interview in the store, half of which is sparsely lined with CD-ROMs. (The other half is packed with books.)

In addition to delivering information in a more useful form, Abt says, CD-ROMs, though fairly costly, ultimately are more cost-effective than paper: a single disk that sells for \$600 can hold as much information as 10 to 20 reference books that sell for \$50-\$75 apiece. They take up less storage space, too. Most CD-ROM players cost between \$700 and \$1,000; they are available predominantly for IBM and IBM-compatible personal computers, although players that work with Apple Macintosh computers are becoming increasingly available.

Many feel that the technology is about to take off. "The first commercial products were shipped on CD-ROM in March 1985," said John Gale, president of Information Workstation Group, a consulting and market research firm in Alexandria, Va., that specializes in portable electronic media. "The CD-ROM industry as a whole was a \$100 million industry in 1987, and it won't have to work very hard to be a billion dollar industry in the next five years."

Last year, publishers pressed 164,700 disks under 750 titles, many of them for internal use by companies, Gale said. More than 200 are on the market, according to a recent issue of CD-ROM Review, a trade publication.

In principle, a CD-ROM differs little from an audio compact disk. Information, reduced to a digital stream of 0's and 1's, is embossed onto the disk as a series

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CD-Rom is full of facts – not music

■ CD

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of pits and flat spots in a single, long spiral track, exactly as on a musical disk. To retrieve the data, a laser beam scans the disk's surface, detecting the pits or their absence, and recreates the original information. So much data can be stored in so little space because the pits are extremely small – only a little larger than the rays of light used to scan them.

But CD-ROM's high storage capacity comes at a price. They are typically much slower at seeking out information on the disk than the magnetic computer disks widely used. A search that takes a quarter of a second on a magnetic disk might take a second or more on a CD-ROM. That is because the CD-ROM drive changes the speed at which the disk spins: it rotates faster for the inner tracks and slower for the outer ones, so that the laser always scans the disk at the same linear velocity. Changes of speed take up time.

More information, however, can be recorded on the outer tracks. A few computers, such as the Apple Macintosh, use the same technique on magnetic disks to increase storage capacity.

People seem willing to trade the speed of hard disks for greater storage. Abt estimates that 50,000 CD-ROM players have been sold in the United States to date, including 10,000 to universities and colleges and 10,000 to hospitals and clinics. These are used mainly to provide professionals with access to indexes of medical and scientific research published around the world.

In the medical world, the disks provide quick access to Medline, a database of thousands of medical journals produced by the National Library of Medicine, said Chris Nims, director of the library at the Massachusetts Eye and Ear Infirmary. Medline contains "citations from most of the medical journals published in the world, with abstracts," she said.

A doctor can sit down at a Medline workstation – basically a personal computer tied in to a CD-ROM player – and within a few minutes obtain a list of, for example, every article published in the preceding five years that mentions hepatitis, intravenous drug abuse, or specifically the articles that mention both.

Mainframe access expensive

Users can also get into the the Medline database by dialing into a



Librarian Mary Kercz uses CD-ROM for search at Boston Public Library.

Globe staff photo/Barry Chin

large mainframe computer, Nims said, but that service is expensive: 50 searches on the dial-in system can cost as much as subscribing to the Medline CD-ROM for a year.

Another CD-ROM contains all three volumes of the Physician's Desk Reference, a collection of information on 2,800 prescription and over-the-counter drugs approved by the Food and Drug Administration.

Clark Abt sees CD-ROM technology as an ideal way to bring the vast storehouse of modern medical knowledge to parts of the world where it is still largely inaccessible.

He has built a "library in a briefcase" consisting of a portable computer, a CD-ROM player and a few disks containing information on, for example, drugs, hazardous chemicals and abstracts of recent research. His hope is that the system, which can be packaged for \$5,000 (excluding the cost of the disks), will make it possible to take the medical knowledge available on CD-ROMs into remote areas of the United States and to Third World countries, where many medical facilities lack basic reference materials, in part because of space constraints.

Nearly any application requiring a lot of paper is a candidate for the laser disks. The Boeing 757 aircraft has a maintenance man-

ual on CD-ROM; it replaces a 7-foot-high, 140-pound set of printed volumes. Parts catalogs for Chrysler, General Motors and Honda are available on the disks.

One recently published disk contains 10 versions of the Bible and 21 books of commentary and reference; another has every book and manuscript surviving from Ancient Greece. The Grollier Encyclopedia and Merriam Webster's Ninth New Collegiate Dictionary are available on CD-ROMs.

By far one of the most visible applications of CD-ROMs has been in libraries, where they are being widely adopted for indexes of journal articles and widely used by researchers and students.

The Boston Public Library has a system called INFOTRAC, which contains citations of articles from business journals and general interest magazines going back three years. Five workstations can be connected to a single CD-ROM player, said Deborah K. Conrad, the library's assistant regional administrator for systems development. She said most academic libraries in the Boston area are "fairly heavy users."

CD-ROMs are found in libraries at Boston College, Massachusetts Institute of Technology, Harvard and Tufts and the University of Massachusetts, among others.

The negative side

But for all the speed and exactness, CD-ROMs are not without their problems.

Acquiring a CD-ROM from a publisher is similar to entering a lease. "In most cases," said Conrad, "you are subscribing to a product. Say you have a funding cut – most [publishers] require that you return the disk. You could end up having a gap in your collection."

Access also can be a problem. Conrad said. Most CD-ROM systems – though not at the Boston library – are not networked, which means only one person can access the disk at a time. One CD-ROM can replace 20 books, she said, but "you could have 20 people looking at 20 volumes. Now you have one person using one disk."

Many CD-ROM publishers have been unwilling to sell additional disks at reduced rates or permit their products to be networked.

But as the price of workstations comes down and networking becomes more prevalent, librarians say, CD-ROM's benefits will outweigh the disadvantages and their popularity will grow.

Simson Garfinkel is a freelance writer who lives in Somerville.

School luncheons – a course in nutrition?

■ HEALTH SENSE

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part of their USDA allotment of turkey made into hot dogs, Bologna and salami, creating leaner

Slipping in just a little more nutrition