



The Compact Disc (CD)

Main informations

- The readable surface of a Compact Disc includes a spiral track wound tightly enough to cause light to diffract into a full visible spectrum
- Media type Optical disc
- Encoding Various
- Capacity Typically up to 700 MB (up to 80 minutes audio)
- Read mechanism 780 nm wavelength semiconductor laser, 1200 kbps (1x)
- Write mechanism 1200 kbps (1x)
- Developed by Philips, Sony
- Usage Audio and data storage

History

- The compact disc was jointly developed by Philips and Sony. In the early 1970s, Philips' researchers started experiments with "audio-only" optical discs, and at the end of the 1970s, Philips, Sony, and other companies presented prototypes of digital audio discs. Philips publicly demonstrated a prototype of an optical digital audio disc at a press conference titled "Philips Introduce Compact Disc" in Eindhoven, The Netherlands on March 8, 1979. Sony first publicly demonstrated an optical digital audio disc in September 1976. In September 1978, they demonstrated an optical digital audio disc with a 150 minute playing time, and with specifications, 44.056 kHz sampling rate, 16-bit linear resolution, cross-interleaved error correction code, that were very similar to those of the Compact Disc introduced in 1982. Technical details of Sony's digital audio disc were presented during the 62nd AES Convention, held on March 13-16, 1979 in Brussels. Later that year, Sony and Philips Consumer Electronics (Philips) set up a joint task force of engineers to design a new digital audio disc. The task force, led by prominent members Kees Schouhamer Immink and Toshitada Doi (土井利忠), progressed the research into laser technology and optical discs that had been started independently by Philips and Sony in 1977 and 1975, respectively. After a year of experimentation and discussion, the taskforce produced the *Red Book*, the Compact Disc standard. Philips contributed the general manufacturing process, based on video Laserdisc technology. Philips also contributed Eight-to-Fourteen Modulation (EFM), which offers both a long playing time and a high resilience against disc defects such as scratches and fingerprints, while Sony contributed the error-correction method, CIRC. The *Compact Disc Story*, told by a former member of the taskforce, gives background information on the many technical decisions made, including the choice of the sampling frequency, playing time, and disc diameter.

Main physical parameters

- The main parameters of the CD (taken from the September 1983 issue of the Red Book) are as follows:
- Scanning velocity: 1.2–1.4 m/s (constant linear velocity) – equivalent to approximately 500 rpm at the inside of the disc, and approximately 200 rpm at the outside edge. (A disc played from beginning to end slows down during playback.)
- Track pitch: 1.6 μm
- Disc diameter 120 mm
- Disc thickness: 1.2 mm
- Inner radius program area: 25 mm
- Outer radius program area: 58 mm
- Center spindle hole diameter: 15 mm
- The program area is 86.05 cm^2 and the length of the recordable spiral is $(86.05 \text{ cm}^2 / 1.6 \mu\text{m}) = 5.38 \text{ km}$. With a scanning speed of 1.2 m/s, the playing time is 74 minutes, or around 650 MB of data on a CD-ROM. If the disc diameter were only 115 mm, the maximum playing time would have been 68 minutes, i.e., less six minutes. A disc with data packed slightly more densely is tolerated by most players (though some old ones fail). Using a linear velocity of 1.2 m/s and a track pitch of 1.5 μm leads to a playing time of 80 minutes, or a capacity of 700 MB. Even higher capacities on non-standard discs (up to 99 minutes) are available at least as recordables, but generally the tighter the tracks are squeezed, the worse the compatibility.

First compact disc



Marantzphilips.nl

Actual compact disc



Made by Martin Zachar and Michal Sadlon
Gymnazium L. Stura, Trenčín