CD-i Technical Summary

CD-i Base-Case Specifications

A CD-i player plays all CD-i titles, CD Digital Audio (CD-DA), CD+Graphics, Photo CD, and CD ROM-XA bridge discs.

Memory

- 2 banks of 512K bytes RAM
- 650M bytes CD ROM-XA
- 8K bytes non-volatile RAM

Audio

- CD-DA: max. 72 minutes
- ADPCM level A: max. 144 minutes, two channels, hi-fi quality
- ADPCM level B: max. 288 minutes, two channels, normal quality
- ADPCM level C: max. 576 minutes, two channels, speech quality

ADPCM audio can be played directly from disk, with negligible computer interaction, or can be loaded into memory to be played with precise timing.

Video

- Resolution: 384x240 when displayed on NTSC, 384x280 when displayed on PAL.
- 2 8-bit video planes
- Background plane in 1 of 8 colors
- 16x16 hardware cursor in 1 of 8 colors
- Video effects: transparency, mattes, color keying, pixel hold, mosaic.
- Programmable video processor to execute video commands on a field and line basis. Commands include: change CLUT; change coding method; change transparency factor; define video memory address, etc.
- Each plane can have multiple image coding methods (video modes) selectable on a per-line basis

Image coding methods

- CLUT4: 16 colors out of 16 million, double horizontal resolution (768 pixels)
- DYUV: 16 million colors, for continuous tone images
- RL7: 128 colors out of 16 million, hardware run-length compression

  Note: DYUV and RL video modes do not allow direct access to the value of an individual pixel and do not allow simple blitting.
- CLUT7: 128 colors out of 16 million
- RL3: 8 colors out of 16 million, hardware run-length compression, double horizontal resolution (768 pixels)

Two more video modes exist that are rarely used:

- CLUT8: 256 colors out of 16 million
  only possible in one plane, the other plane can only be DYUV; it is restricting compared to CLUT7.
- RGB555: 32768 colors
  uses both planes, and requires twice as much data per screen, it is restricting and slow compared to the other video modes.

Processor

- 15 MHz 68070, equivalent to 8 MHz 68000

Operating system

- CD-RTOS: OS-9 with CD-i extensions. Light-weight, real-time multitasking operating system

Digital Video Specifications

Digital Video is an extension to the base-case specification. Players equipped with this extension have the following additional features:

Digital Video uses the MPEG ISO 11172 standard for compression.

Digital Video is non-interlaced video and can have playback rates of 24, 25 or 30 pictures per second for film, PAL/SECAM and NTSC source material, respectively. Regardless of the picture rate, Digital Video can be played back on NTSC and PAL/SECAM systems. Digital Video performs temporal frame rate conversion without impact on picture size. Aspect ratio distortion does occur, because PAL/SECAM and NTSC have different aspect ratios. A compatible aspect ratio is defined that results in minimal distortion on both PAL/SECAM and NTSC systems.

The maximum picture size depends on the picture rate: 352x288 at 25Hz or 352x240 at 30Hz . Short and wide pictures (for example, 704x120) or high and narrow pictures can also be coded.

You can display only a sub-rectangle of the Digital Video image, and you can define the position of that rectangle on the CD-i display.

Digital Video is displayed in the backdrop plane of CD-i. Digital Video is visible only where the two CD-i base-case planes are transparent.

Audio allows bit rates from 4 kB per second for mono speech up to 56 kB per second, where 24 kB per second subjectively equals stereo CD-quality audio. Digital Video audio is mixed with CD-i base-case audio.

A typical full screen video stream uses 146 kB per second. The size of a video stream is determined by the picture quality, the picture size, and the picture rate. One can have multiple video and audio streams, but only one of each can be active at a time. The maximum data stream is 170 kB per second.

Digital Video allows for the following play modes: forward play; forward slow motion; freeze frame; forward and reverse scan/skip.

Digital Video players have an additional 1536 KBytes RAM, organized as 1024 KBytes general purpose, system RAM and a 512 KBytes MPEG buffer RAM.

Philips and the authors accept no liability for the information presented herein. For comments, additions, corrections, or if you have remaining questions, contact:

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